MINING WORLD

in this issue

Kennecott's Oswaldo Zinc Mine

Page 20

Contractors Prefer Eimcos —
for loading underground — they're fast, dependable and economical. There's an Eimco for every loading job.
EIMCO
THE EIMCO CORPORATION
The World's Largest Manufacturers of Underground Rock Loading Machines
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AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

APRIL 1, 1952

Vol. 14 No. 4

35 cents a copy
In Sterling, 3s

BUCKETS or PUMPS ?

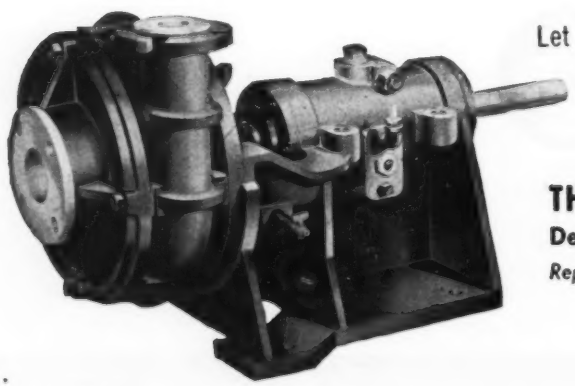
Until recently, bucket elevators have been handling ball-mill discharge, but more and more engineers are changing over to Hydroseal Pumping Systems. Here's why:

They can be installed for less than half as much money

Maintenance and power costs are appreciably lower

Installation requires less space and is more flexible

Standby provisions prevent crippling shut-downs



Let a Hydroseal abrasives-handling engineer analyze your problem . . . chances are, he can help you solve it.

THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. J —259 E. Lancaster Ave., Wynnewood, Pa.
Representatives in Most Principal Cities

What's New in hydroseparators?

THE DORR TYPE BW

a rugged center-shaft mechanism in the 40 to 75′ diameter range.

Newest addition to the Dorr line of hydroseparators is the Type BW — a modification of the thoroughly proven and accepted Type H introduced several years ago. It is the *economical* answer to the problem of handling granular solids which do not warrant the use of the heavier Type H — but which are too heavy for a standard unit. Here are its major features...

Power to spare when you need it . . . through the BW's heavy-duty balanced worm and spur-gear drive.

Positive overload protection . . . by means of an automatic hydraulic lifting device activated by the torsional load on the mechanism. When an overload is encountered the rakes raise quickly — then lower slowly as the overload is reduced.

Unique Center-Shaft Design . . . combining an outer drive tube to which the pivoted drive rods are hinged and an inner lift tube which carries the rake arms.

Free, center-cone discharge — entire rake and drive mechanism is supported by a truss spanning the tank. Result . . . a clear center-cone area . . . providing unimpeded discharge of heavy solids.

The Type BW is available in diameters ranging from 40 to 75 feet. We'd like to tell you how it can fit into your picture economically . . . without obligation of course.

DORRCO

Better tools TODAY to meet tomorrow's demand

DORR

WORLD - WIDE RESEARCH · ENGINEERING · EQUIPMENT

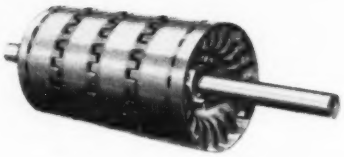
THE DORR COMPANY · ENGINEERS · STAMFORD, CONN.

Offices, Associated Companies or Representatives in principal cities of the world

Which Answers Your Tramp Iron Problem BEST?

MAGNETIC PULLEYS?

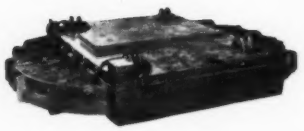
Powerful, air cooled electro magnetic pulleys are ideal where well loaded conveyor belts are used. Installed as head drive pulley, tramp iron is discharged automatically. Low operating cost, long life and extreme power characterize this workhouse of the Dings line. Catalog C-1001A tells you why this magnet is exceptionally efficient.



Dings *non-electric, self-energized* Perma Pulley magnets are recommended where burden depths do not exceed 3". Within this range, these are the magnets to use because of their unsurpassed concentration of magnetic strength near the surface. Catalog C-1007A.

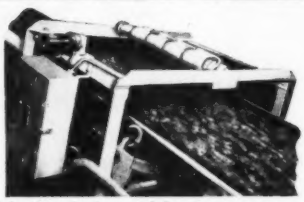
SUSPENDED RECTANGULARS?

Power close and power that searches down as deep as 30" to yank tramp iron out. If the Dings RM rectangular won't do it, it can't be done. Triple pole, double gap design. Install horizontally, vertically or at an angle above belt conveyors or in chutes. Self-cleaning fully automatic models also available. Write for details.



MAGNETIC DETECTOR?

The Dings Magnetic Detector instantly signals when any magnetic object large enough to be damaging passes through the detector zone. Can be hooked up to sound an alarm and stop the belt. Ideal protection for crushers, grinders, pulverizers, etc., where belt speeds are so excessive or burden depths so great no magnetic separator can function successfully. Detectors are available for belt widths from 18" to 72". Two types are available. One employs an electro magnet and the other, a permanent magnet. Performance of the two is comparable.



Magnets shown here are available in size ranges for most applications. Special magnets can be made for any application. Write today for recommendations.

DINGS MAGNETIC SEPARATOR CO.
4719 W. Electric Ave., Milwaukee 46, Wis.

Dings Certified
MAGNETIC STRENGTH

MINING WORLD, April, 1952. Volume 14 No. 4. Published monthly, except April when publication is semi-monthly, at Emmett St., Bristol, Conn. Executive, advertising and editorial offices, 121 Second St., San Francisco 5, California. Subscription in United States, North Central and South America, $3.00 per year; other countries, $4.00 per year. Entered as second class matter Oct. 10, 1951 at the Post Office at Bristol, Conn., under the act of March 3, 1879. Postmaster: please send notice 3579 to MINING WORLD, 71 Columbia St., Seattle 4, Washington.

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TYPE CF
WITH SAFETY
SWIVEL SHACKLE

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Pacific Offers

FULL SHROUD

Sheave Blocks

OUTSTANDING FEATURES

(Same as our famous Model C line.)—Roller bearings—Positive Grease Seal—Manganese Steel sheaves and side frames for longer service and extra protection for cable. Toggle pins attached to sheave blocks on heavy-duty chains.

BE SPECIFIC—ORDER PACIFIC

For added efficiency, use Pacific Slushmaster Scrapers, Pacific Anchors, Pacific Bit Knockers, Pacific Jaw Crushers and Pacific Wearing Parts.

Announcing the newest addition to the growing family of Pacific Mining Products! Model CF Full Shroud Sheave Blocks are available in 8", 10" and 12" sizes with hook, shackle or safety swivel shackle suspensions. All parts are interchangeable with our Model C line of Half-Shroud Sheave Blocks, known for years for their dependability, toughness and long life. Pacific manufactures a complete line of Sheave Blocks including 16" tail block assemblies, 8" wide-throat guide sheave blocks and others. Send for bulletin.

ALLOY STEEL & METALS CO.

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Forminiere mechanizes

Cleaning the cut, maintaining haul roads, pusher-loading Tournapulls are just a few of the many jobs handled by Tournadozers at this Belgian Congo mine. In addition to their Tournapulls and Tournadozers, Forminiere uses a rear-dump 16-ton Tournarocker to haul diamond-bearing gravel.

At BAKWANGA, BELGIAN CONGO, mining engineers located vast new deposits of industrial diamonds under 30 meters (100 ft.) of sand, clay and loose rock. While the Bakwanga area has for years produced a large portion of the world's industrial diamond supply, older deposits, nearer the surface, had chiefly been uncovered by native hand labor. To remove economically the great depth of overburden on the new findings, the most efficient stripping method was necessary.

Remove 6,000,000 m³ of overburden with 14 LeTourneau earthmovers

Forminiere, acting for the owners of the Bakwanga Industrial Diamond Mines, carefully considered all types of earthmovers, then bought a fleet of 14 new LeTourneau machines to handle the entire 6,000,000 m³ (7,850,000 cu. yd.) project. Their 9 electric-control Tournapull-Scrapers drove 150 km. (93 miles) from the nearest railroad siding to the mine in 5 hours. Their 5 Tournadozers made the 150-km. trip under their own power in 8 hours.

5 Tournadozers, 9 Tournapulls speed clearing, stripping

Since arriving at Bakwanga, the machines have worked over 2000 hours each, through both rainy and dry seasons. The 9 high-speed Tournapulls load, haul, and dump overburden. Each of these self-propelled scraper units, driven by a native operator, moves 6 to 7½ loads, 45 to 56 m³ (59 to 73 cu. yds.) of sandy material hourly on a haul cycle of 1600 meters (1 mile).

Put work "far ahead of schedule"

The Tournadozers handle all pusher-loading, clear bush grass (often 3 meters, 10 ft., in height), level areas for stripping, and maintain haul roads. One of these versatile bulldozer units is also equipped with a sideboom crane for part-time lifting and repair work. So efficient has been this LeTourneau method that stripping is far ahead of schedule. Forminiere officials say their Tournapulls and Tournadozers move even more earth and at a lower-cost-per-meter than was originally expected.

If you have earth to move, ask your LeTourneau Distributor how these dependable machines can simplify operation, lower costs, and increase your production. He will be glad to help you analyze your equipment requirements or to put you in touch with the owner of the nearest available LeTourneau fleet. He is a good friend to know.

R. G. LeTOURNEAU, INC.

PEORIA, ILLINOIS

its diamond mining methods

...pull 10.5 m³ Scraper is pusher-loaded to capacity in ... seconds by a 186 h.p. Tournadozer. In this section of the mine, this 1 Tournadozer efficiently serves 4 Tournapulls which are hauling 800 meters (½-mile) one-way.

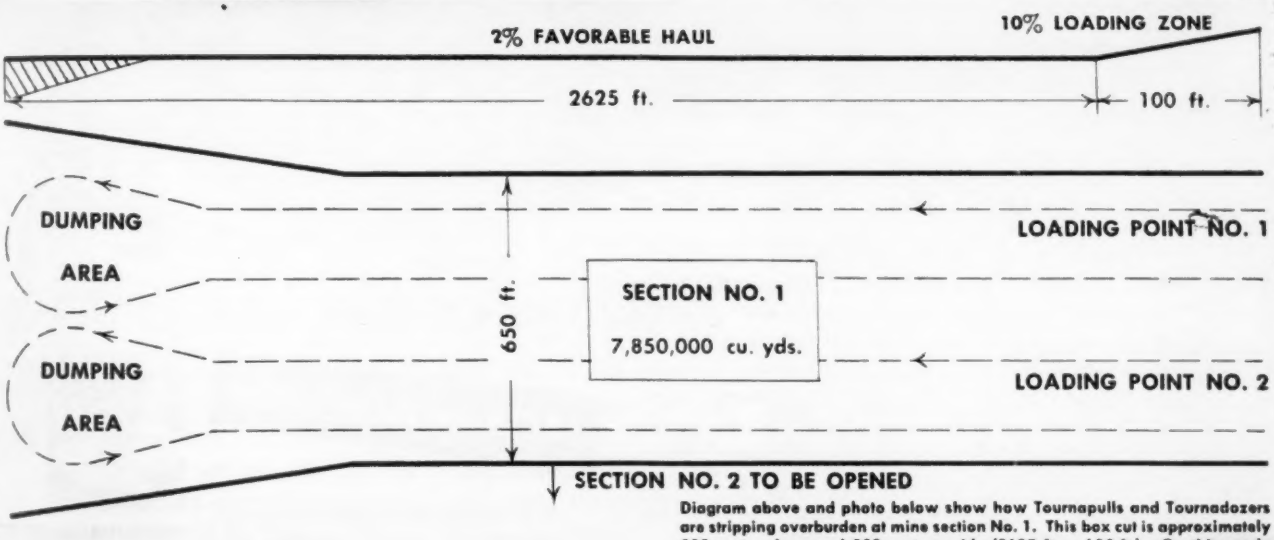
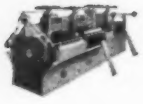


Diagram above and photo below show how Tournapulls and Tournadozers are stripping overburden at mine section No. 1. This box cut is approximately 800 meters long and 200 meters wide (2625 ft. x 650 ft.). On this work, Tournapulls travel at speeds up to 56 km./h. (35 m.p.h.).

...dozer—Trademark Reg. U. S. Pat. Off.
Tournapull—Trademark EX1156

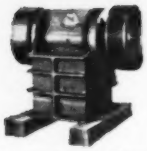
HIGH-SPEED, RUBBER-TIRED HAULING • EXCAVATING • LIFTING EQUIPMENT

LETOURNEAU LET EQUIPMENT



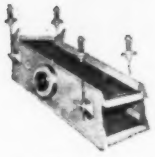
Denver "Sub-A" Flotation

Denver Disc Filters



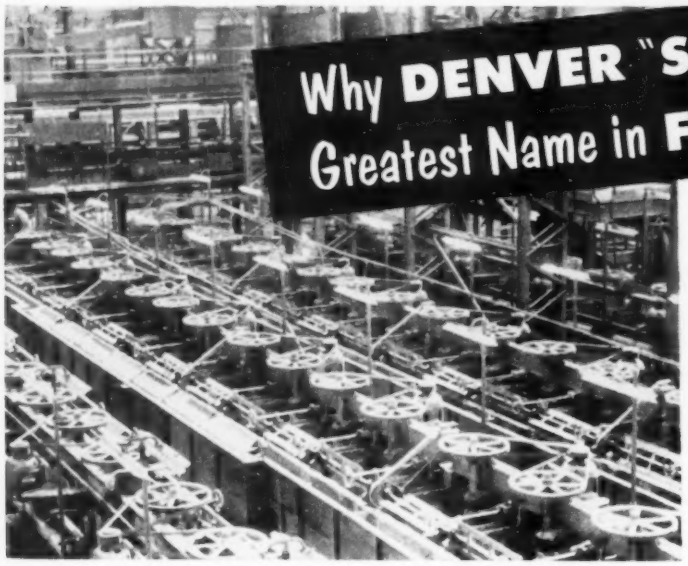
Denver Jaw Crushers

Denver Steel-Head Ball Mills



Denver-Dillon Vibrating Screens

Why DENVER "SUB-A" is the Greatest Name in FLOTATION



This copper concentrator made exhaustive tests—erected a 500 ton per day pilot plant; compared flotation machines. These tests proved Denver "Sub-A" greatness. They now have 32 No. 24 and 120 No. 30 Denver "Sub-A" Flotation Cells treating 5000 tons of copper ore per 24 hrs.

Proof of Denver "Sub-A" greatness is the fact that over 33,000 Denver "Sub-A" Flotation Cells are serving around the world!

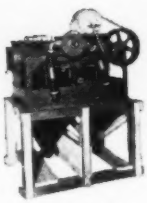
Moreover, there are more Denver "Sub-A's"—*probably more than all other Flotation Machines combined*—because Denver "Sub-A's" are the very best! This is an important fact. It has been proved many times by competitive tests.

Tests, like those conducted by the large copper concentrator pictured above prove that comparing capacity for capacity, horsepower for horsepower, cost per ton of ore processed and smelter receipts for concentrates produced, DENVER "SUB-A's" *are best by a very substantial margin.*

This copper concentrator tested many different flotation machines. The net result—*and it is the NET RESULT that means profits*—was definitely in favor of Denver "Sub-A" Flotation.

DENVER "Sub-A's" are standard flotation machines, flexible to meet changing conditions of your ore. They are built to give mill operators those tools needed to get results that pay greatest profits.

Denver Super Agitator and Conditioners



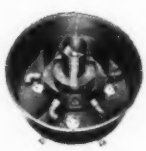
Denver Selective Mineral Jigs

Denver-Buckman Concentrators

FACTS about the Leader

Denver Thickeners

In 25 years DECO has pioneered practically every major improvement in Flotation. Denver "Sub-A" was first with low-head design, steel tanks, molded rubber wearing parts, supercharged aeration and many more features of flexibility that improve metallurgy and simplify mill operation.



Denver Pulp Distributor

Our 25th Year of Flotation Engineering

Write FIRST to DECO for complete mill equipment from testing to feeder to dryer.

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

FLOTATION ENGINEERS

DENVER • NEW YORK • CHICAGO • EL PASO

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"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT COMPANY

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What's behind the Euclid name?

Building a road in the mountains of Colorado—this "Euc" is dumping 15 tons of fill material.

Working on a levee in Arkansas—Bottom-Dump Euclids are the outstanding choice of levee contractors.

Getting a 22-ton load of rock at Dawnsville Dam in New York—"Eucs" are built for heavy off-the-highway work.

PARTS AND SERVICE FACILITIES

The Euclid reputation for long, dependable service life and efficient performance is backed by strategically located distributors and factory branches. Adequate stocks of genuine Euclid parts and the facilities of this world-wide organization assure prompt service to Euclid owners everywhere.

The fact that 80 per cent of all Euclids built are still in use today is proof of their rugged construction and staying power on the toughest jobs. Readily available parts and service result in less down time and customer satisfaction.

Have your Euclid Distributor show you how "Eucs" can lower your off-the-highway hauling costs. Ask about the models best suited for your own job requirements.

The EUCLID ROAD MACHINERY CO.,
CLEVELAND 17, OHIO

MORE LOADS PER HOUR—
MORE PROFIT PER LOAD

EUCLIDS *Move the Earth*

QUICK SHIPMENT

COLUMBIAN BOLTED STEEL MINING EQUIPMENT

AGITATORS •
THICKENERS • SOLUTION TANKS • ORE BINS, ETC.

No costly delays. Your order is handled in record time by an expert staff of engineers and designers. Then it is fabricated in one of the best equipped manufacturing plants in the Mid West, with modern presses especially designed for the purpose.
Lower your costs with Columbian Mining Equipment for permanent installation, yet portable if change in location is necessary. Standard construction for domestic use or for export by ocean freight. Special if for export via mule-back or airplane to final destination. Order from distributors listed below—or write direct for complete facts.

COLUMBIAN STEEL TANK CO. • Kansas City, Mo.

Distributors in the United States

Denver Equipment Company
1400 Seventeenth Street, Denver, Colorado
Eimco Corporation
34 South 4th West Street, Salt Lake City, Utah

Distributors—Foreign

Avenida Ejercito Nacional 458, D
Colonia Chapultepec Morales
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Resists Impact and Abrasion!

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CF&I Forged Steel Grinding Balls and Rods

THE CALIFORNIA WIRE CLOTH CORPORATION, OAKLAND
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CAL-WIC INDUSTRIAL SCREENS

THE COLORADO FUEL & IRON CORPORATION CF&I

GRAB SAMPLES From the Mail

American Metal Market Quotations

Dear Sir:

Please allow me to compliment you on including the quotations of the *American Metal Market* in your *World Mining* issue of December 1951.

May I please ask you to make this a monthly feature, and oblige.

A. R. Barber
Mine Manager
Malvern, Johannesburg
Union of South Africa

A Worth While "Sight"

Dear Sir:

We have been given a sight of the December issue of your magazine, *World Mining*, which we have found most interesting.

We are a mining company, with our interests mostly chrome, in Southern Rhodesia and would like to receive your magazine if this is possible.

We wonder whether you could let us have a list of ferrochrome producers who would be interested in Southern Rhodesian chrome, basis 48 percent Cr_2O_3 and a chrome to iron ratio of 3 : 1.

D. P. Young
Managing Director
African Consolidated Mines Ltd.
Salisbury
Southern Rhodesia

A Correction For The Record

Dear Sir:

Please permit the liberty of making a couple of corrections in the paragraph on Pacific Northwest Alloys Company, column two, page 96, March 1952 issue of the *Mining World*.

The capacity of the Mead magnesium plant here is 4,000,000 pounds of magnesium monthly, or 48,000,000 pounds annually.

The company is a subsidiary of Chromium Mining & Smelting Corporation, Ltd., a Canadian corporation with main offices in Sault Sainte Marie, Ontario, and executive offices, 1010 Canada Cement Building, Montreal. Chromium Mining & Smelting Corporation of New York is a subsidiary controlling Montana Ferroalloys, Inc.

Just thought you might like to know for the record.

Hamilton Owen
Manager
Industrial Department
Spokane Chamber of Commerce

A Small Criticism from London

Dear Sir:

I have enjoyed receiving and reading *World Mining* very much. . . . It is a unique publication and the statistical issues you publish from time to time are outstanding and particularly useful to all mining engineers. If you will allow me to make one quite small criticism, I sometimes find the presentation of the valuable items in "International Panorama" rather confusing and difficult to read. What I am trying to suggest is that the segregation of the different items would perhaps allow those of special interest to the reader to be found more regularly.

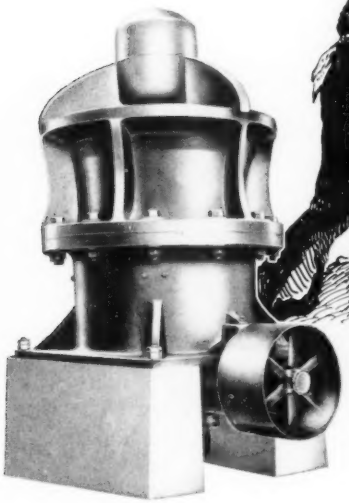
Thank you sincerely for sending me the magazine and I wish you all success with it in the future.

J. H. Fennell
5 Elm Park Mansions
Park Walk, Chelsea
London, S.W. 10, England

Segregation of the items in "International Panorama" is impossible. They are the most important mining events of the month in all parts of the world. They must accordingly vary with mining's changing pattern both as to minerals and metals, and locations.—Ed.

the hard way . . .

This old Mexican method of crushing ore applied the simple laws of gravity and leverage—excellent principles but inefficiently used in this case.

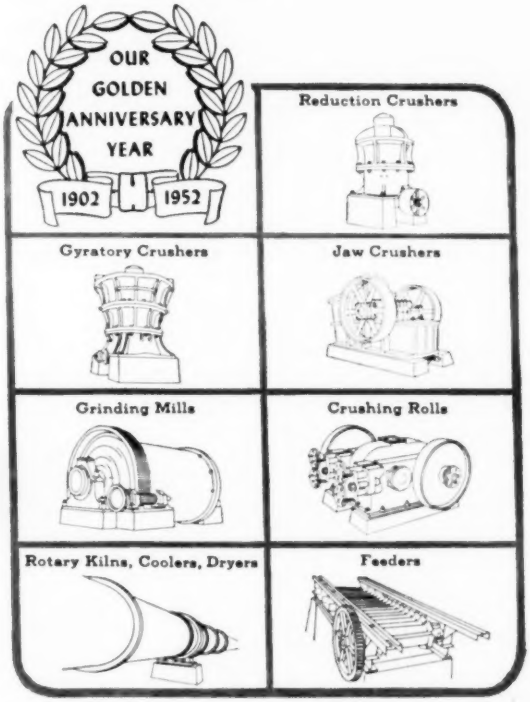


The Traylor TY Reduction Crusher is a perfect example of compact, simple design for efficient operation. For specifications and description, ask for Traylor Bulletin 6112.

THE MINING INDUSTRY passed through many interesting and unique phases before reaching its modern level of efficiency.

For 50 years, Traylor spearheaded its advancement by developing more efficient machinery for crushing ore. As processes and methods changed, Traylor took the lead in supplying new and improved equipment to fit each specialized job.

Mining men know that to solve new problems, there is no substitute for experience. Traylor has experience —half a century of it.



Traylor

ENGINEERING & MANUFACTURING CO.

473 MILL ST., ALLENTOWN, PA.

Sales Offices: New York • Chicago • Los Angeles
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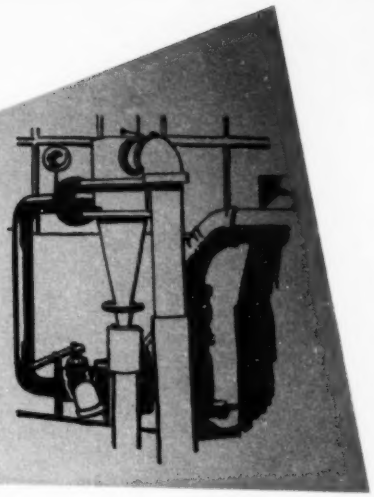
A TRAYLOR LEADS TO GREATER PROFITS

Here's the picture on REAGENTS AND PROCESSES for the difficult days ahead

Metal consumption both for re-armament and essential civilian use has yet to reach its inevitable all-time peak. But all production/consumption estimates now indicate that chemical beneficiation of greater tonnages from existing mines must be augmented by developing new, known ore-bodies. Thus, an assured supply of metallurgical chemicals and the application of improved processes are the very foundation stones of expanded metal output.

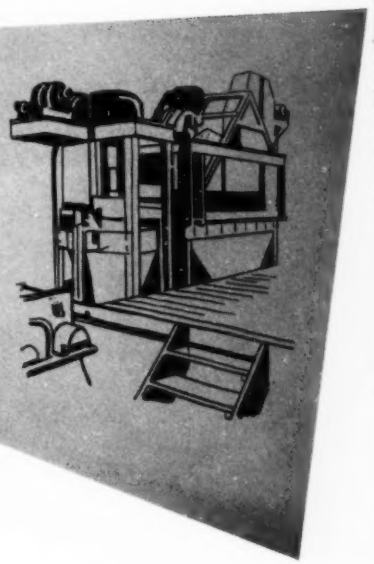
Long a leading industrial-chemical producer as well as an important source of reagents and treatment processes, Cyanamid has a mature understanding of the problems posed by a simultaneous upsurging demand for both metals and chemicals. Though no one can foresee, much less bind the future, Cyanamid has met and mastered similar problems in previous periods of world upheaval ... confidently expects to do so again.



When peace returns worldwide, we still expect to be able to say: No Cyanamid customer ever had to suspend production for lack of Cyanamid Reagents.

Specificially here is a high-spot inventory of what Cyanamid stands ready to provide its customers in every mining field:

REAGENTS As shown on the page opposite, Cyanamid offers a most complete line of cyanidation and flotation reagents. Notable specialized reagents have been added during recent years. Others are being aggressively researched. Production facilities are available for expected peak output.



PROCESSES With recent commercial operation of two Dutch State Mines Cyclone Separator plants to beneficiate iron ore fines in the ¼" x 65 mesh size range, Cyanamid now offers proven processes for a wide variety of ores in all size ranges from 6" to 0. These processes include: Heavy-Media Separation for 6" x 10 mesh feed; Dutch State Mines Cyclone Separator for the ⅜" x 65 mesh size-range, and Specialized Froth Flotation in the 65 mesh x 0 size range. Millions of tons of commercial experience with these processes, alone and in combination, have resulted in a tremendous fund of experience in their most efficient use.

TESTING AND APPLICATION SERVICE. Paralleling the growth of the Reagents and Processes offered, Cyanamid has simultaneously expanded its staff and facilities for technical service. To a greater degree than ever before, we can provide dependable, unbiased testing services prior to selection of the processes and reagent combinations needed to treat refractory ores. Likewise, we can give you practical on-the-mill help in applying recommended reagents and processes to your feed.

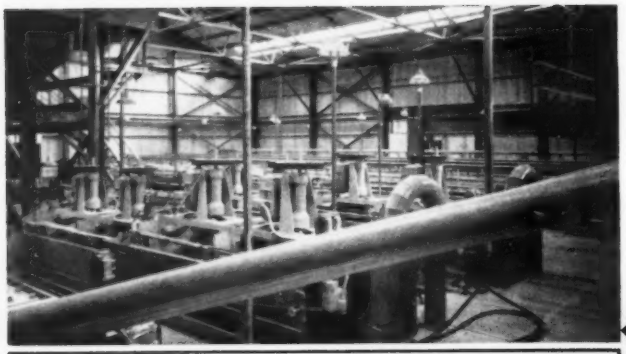
First step toward utilizing all the resources Cyanamid provides for its customers is a discussion of your problems and objectives with a nearby Cyanamid Field Engineer. Since he is in constant touch with headquarters, your letter or telephone call will bring his prompt and intelligent attention.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK

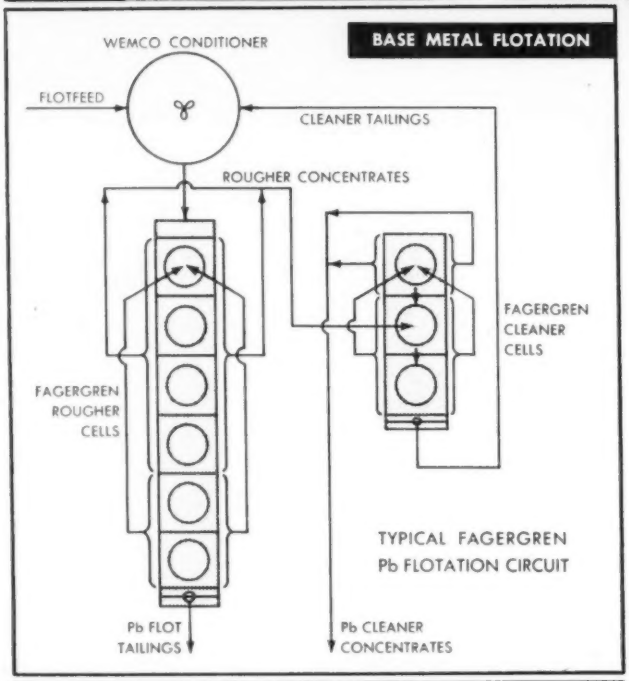
Printed in U.S.A.

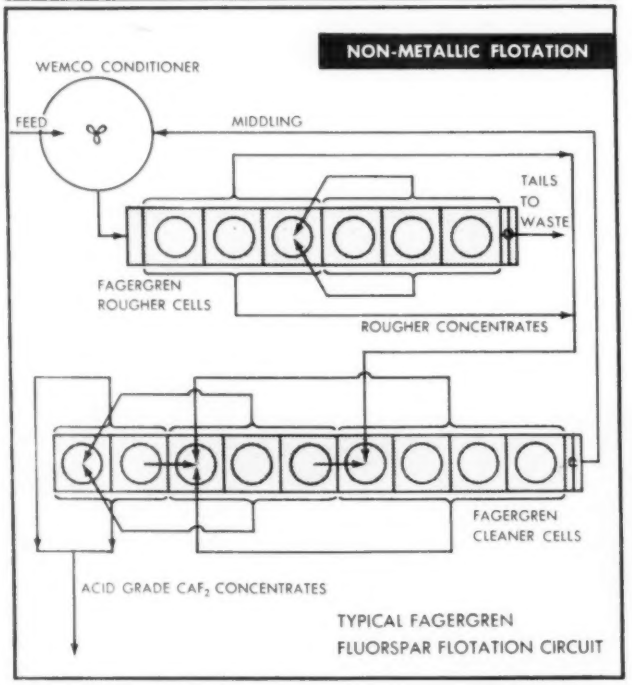


FAGERGRENS!

for

FLEXIBILITY OF CELL ARRANGEMENT





The flexibility of cell arrangements provided by Fagergren Flotation Machines is depicted on the accompanying flowsheets. Fagergrens give top performance in medium size and small circuits by the recirculation of flotation products to effect cleaner, recleaner and secondary rougher operations. Cells are arranged for product transfer by:

- ***gravity flow***
- ***on one floor level***
- ***without using auxiliary sand pumping equipment***

Maximum flexibility of cell arrangement is gained while retaining the high metallurgical efficiency provided by the Fagergren rotor-stator principle of pulp aeration and dispersion.

Check these advantages of

FAGERGREN FLEXIBILITY

- *low installation costs*
- *low operating costs*
- *high metallurgical efficiency*
- *large capacity*
- *minimum attendance*
- *minimum maintenance*
- *low reagent cost*

Write today for further information on how to use Fagergren Flexibility to improve your flotation results.

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WESTERN MACHINERY COMPANY
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OTHER **WEMCO** PRODUCTS

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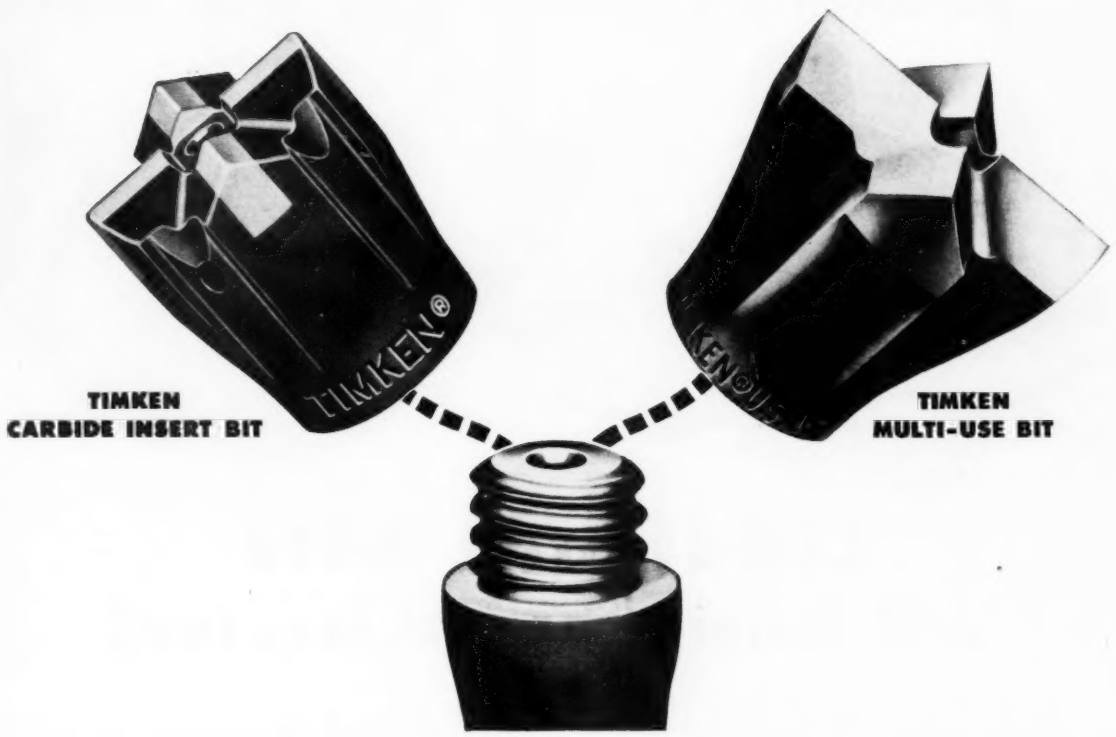
BOTH FIT THE SAME DRILL STEEL!



Interchangeability of TIMKEN® bits lets drillers switch quickly to the most economical bit for any drilling condition

NO need to have more than one type of steel at the drilling face.

With correct and controlled reconditioning, Timken® multi-use bits give you the lowest cost per foot of hole when full increments of steel can be drilled.

Timken carbide insert bits are the most economical bits for hard and abrasive ground, and your best bet for maximum speed, constant-gauge holes, small-diameter blast holes and very deep holes.

The combination of the two is unbeatable—puts the best answer to every drilling requirement right at your drillers' finger tips. Timken carbide insert bits and multi-use bits are interchangeable in each thread series.

Remember that both types of Timken rock bits have these three important advantages: (1) made from electric furnace Timken fine alloy steel, (2) threads are not subject to drilling impact because of the special shoulder union developed by the Timken Company, (3) quickly and easily removable.

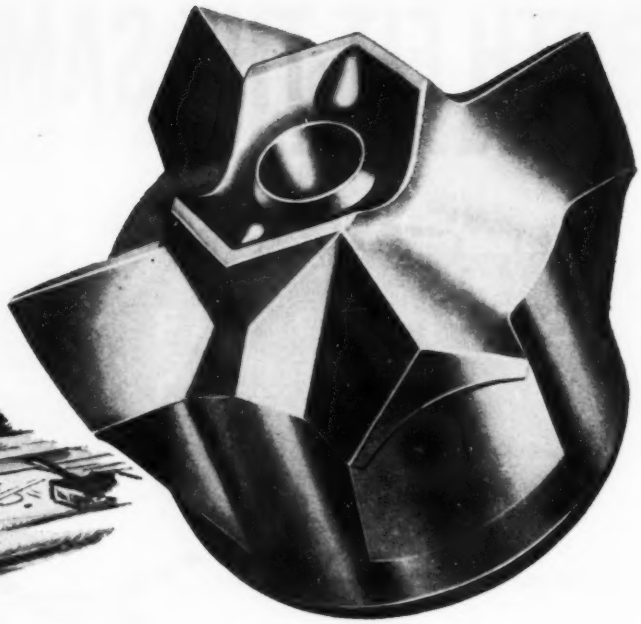
To get the drilling performance you're after call on the Timken Rock Bit Engineering Service. Backed by 20 years' experience in solving rock bit problems, our rock bit engineers can help you select the best bits for your job. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

your best bet for the best bit . . . for every job

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

Why search further? ⇨⇨



Liddicoat bits
drill faster, longer at less cost!

Action packed Liddicoat bits are designed for fast cutting performance and long cutting life at low initial cost per bit to give lowest cost per foot of hole drilled. Used to equal advantage in drifting, stoping, raising or sinking, a handful of Liddicoat bits literally does a whole shift's drilling.

Liddicoat two-stage cutting action and special wing design guarantees speed and long gauge life by retaining cutting edges and reaming edges.

Since resharpening is not involved, Liddicoat bits are designed for only one purpose . . . maximum drilling efficiency. These bits actually chip out rock instead of battering it until pulverized as do more expensive, ordinary conventional bits.

Your search for faster and better drilling ends if you join the ever expanding list of the world's outstanding mining and contracting concerns now receiving distinguished service from Liddicoat's unsurpassed detachable rock bits.

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Section "AA", along the high-centre wings. Section "BB", along the low-centre wings.

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"Every Little Bit Counts"

MINING WORLD

and the export edition

WORLD MINING

A Miller Freeman Publication

Published monthly except in April when publication is semi-monthly

APRIL 1, 1952

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COVER CIRCLE: The all-steel, heat-reflecting silver headframe at the Oswaldo No. 2 shaft of the Kennecott Copper Corporation north of Santa Rita, New Mexico.

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DRIFTS AND CROSSCUTS

Chart a Gold Program

Harry Sears, president of the Calaveras Central Gold Mining Co., Ltd., Angels Camp, California, outlined a practical gold program at the annual convention of the Colorado Mining Association as follows:

"As practical men who know and respect gold, we can chart a program. This is not a program for mining, but a plan for national safety which can add to the security of all citizens. Unfortunately, the great majority of citizens are completely ignorant of the great benefits they may have if they will support and assure the passage in the United States Congress of the following definite measures planned for our mutual protection:

1. A Bill or a Joint Resolution declaring gold as a critical and strategic metal, so that it may be so classified for all production purposes and necessities.

2. A Bill to permit all citizens of the United States to buy, sell, and possess gold in any form, basing this on their Constitutional property rights.

3. A Bill to permit the sale of domestically mined gold within the United States, freely and without any requirement for license from the Treasury. This Bill would also prohibit the Treasury from selling any gold in the monetary reserve in any open market or to any commercial user or processor of gold in the arts or in industry.

4. A Bill or a Joint Resolution declaring that the sense and meaning of Congress in interpreting the statutory price of gold to be 1/35th of an ounce to the dollar, shall be construed to be dollars of purchasing power equal to those current at the time said statutory price was declared, and that all gold sales hereafter or transfers of gold shall be priced accordingly—also establishing the consumers price index as the method of determining the purchasing power during any month to control the price level for gold transactions during the following month.

5. A Joint Resolution or House Resolution authorizing a special committee who shall cooperate with the Controller General, and such employees as he may delegate, to inspect and audit the gold assets of the government at Fort Knox, or wherever they may be situated, and to report in every detail every obligation against said gold."

Size of "Free Market" For Gold

There has been much speculation as to the extent of the market for nonmonetary-gold. This has been particularly true since the International Monetary Fund lifted its ban on nonmonetary sales on September 28, 1951.

The first real figures to show the importance and extent of this market have recently reached the United States. They were compiled and furnished by the Transvaal Chamber of Mines, Johannesburg, Union of South Africa, and show the 1951 sales to be valued at £6,693,-001 compared to 1950 sales valued at £2,123,547. (The pound Sterling being equivalent to $2.80 United States.) Premium income from nonmonetary sales was equivalent to 4.9 percent of total income in 1951, as against 1.5 percent in 1950. Total Transvaal gold production in 1951 was 11,487,105 fine ounces, a slight decrease from the 11,659,280 in 1950.

COMING CONVENTIONS

April 17 and 18, 1952. PERLITE INSTITUTE, Phoenix, Arizona.

April 18 and 19, 1952. Annual Meeting LEAD INDUSTRIES ASSOCIATION, Drake Hotel, Chicago, Ill.

April 21 and 22, 1952. Annual Meeting AMERICAN ZINC INSTITUTE, Hotel Statler, St. Louis, Missouri.

April 21 through 23, 1952. Diamond Drilling Symposium arranged by the Chemical, Metallurgical and Mining Society of South Africa and the Diamond Research Laboratory, Johannesburg, Union of South Africa.

September 8 through 15, 1952. XIX Session INTERNATIONAL GEOLOGIC CONGRESS, Algiers, Algeria.

CAPITOL CONCENTRATES

METAL SHORTAGES EASE WITH LEAD USE-RESTRICTIONS OFF

There are growing signs that the critical metal shortage is becoming less critical. In the parade of metals, lead is leading the way.

Only last fall lead was super-scarce. About one-third of the United States supply normally comes from abroad, and high foreign prices were attracting all production to those markets. Now foreign prices have dropped from the 23 cents a pound quoted last summer to the U. S. ceiling of 19 cents.

Some metal men predict that March imports of lead will reach 28,000 tons, more than double the shipments of last September. As a result, government curbs on lead uses and stocks have been eased.

The let-up in demand comes partly from lower requirements from battery makers, the biggest lead users. Replacement demand is slow, stocks are high, and new-car battery demands have been reduced by the cut in auto production.

As to zinc, purchasing agents report the metal is easier to find than a month ago; and several types of steel are said to be in ampler supply. Also, the premium prices for copper in the world markets are declining sharply, indicating a better supply-demand situation.

• *Restoration of Gold Standard Asked*

Representative Reed of New York has placed before the House of Representatives a bill designed to restore the rights of American citizens to freely own gold and gold coin, and to establish and maintain a domestic gold coin standard.

The bill declares that the standard monetary unit of the United States shall be a gold dollar of 15 21/100 grains of 0.9 fine, and that standard gold coin and gold certificates shall be full legal tender. All other money of the United States shall be maintained on a parity with the standard gold dollar by freedom of exchanges at par with standard gold.

Reed's measure would repeal all provisions of law authorizing the President to alter size, weight, or fineness of gold and silver coins. The bill has been referred to the Committee on Banking and Currency.

• *Willingness To Pay Is The Answer*

Representative Mills of Arkansas last month delivered an impassioned address on the Floor of the House to point up the useless domestic manganese program of DMPA and GSA. Other congressmen interposed their ideas of what is wrong and what should be done. Everyone seems to be puzzled and thrown for a loss by the screams from top brass for all production from foreign and domestic sources that is "economically feasible."

The problem really is very simple. In a controlled economy, "economically feasible" simply means what the government is willing to pay. In all of these alleged programs if nothing comes out it means the government is not willing to pay. If the government is not willing to pay it means there is no real pressure to obtain the material from domestic sources, all the speeches to the contrary notwithstanding.

It is as simple as that, Congressman Mills. You think it is needed; the planners disagree with you. If Congress is convinced it is right, then a bill should be passed establishing an adequate purchase program and price.

• *Loan May Not Be Accepted*

It appears that the Tungsten Mining and Milling Company loan, one of the first mining defense loans to get through the maze of red tape, certification, and approval by the RFC, may not be disbursed after all. Rumor hath it that the RFC imposed such terms on the applicant that it was better off without accepting the money.

The RFC counterpart institution, the Export-Import Bank, which functions in DMPA's foreign field, feels differently. With them, certification as to essentiality is tantamount to an order to pay the money. Furthermore, very little red tape is involved in obtaining government money for foreign projects. A foreign case takes less days to process than the domestic division takes months for the same sort of case. And what is more—the money is made available and there are no monkey-tricks.

• *Patten Bill Seeks Mineral Department*

Creation of a Department of Mineral Resources is asked in H.R. 6586, introduced in Congress by Representative Harold A. Patten of Arizona. The Patten bill is practically the same as one introduced earlier in the session by Representative Baring of Nevada.

Both bills call for a new department to be headed by a secretary of cabinet rank. To his department would be transferred all functions which relate to minerals and mineral resources of the United States, including petroleum and nonmetallic minerals.

Patten has commented that he and Representative Baring are hopeful that they can obtain favorable action on the bills.

• *Venture Capital Being Siphoned Off*

President D. A. Hulcy of the United States Chamber of Commerce maintains that so much venture capital is being taken by the government that the money doesn't have time to become venturesome.

"We must have a constantly progressive source of venture capital to launch new enterprises and to put yeast cakes in the old enterprises for expansion," Hulcy told a meeting of the Texas Bankers Association in Dallas. But such is not the case, he said.

"We are siphoning off our venture capital, the life blood of our economy, through the process of undue taxation," Hulcy explained. "We are using venture money for government adventures that are socialistic in fact if not socialistic in name. And the government is using it in a fashion that contributes nothing at all to the baking of bigger and better and more equitably divided economic pies."

• *Canada Continues Aid To Gold Mines*

Finance Minister Abbott of Canada has announced that government assistance to gold mines in that country will be continued unchanged for the next two years. For 1951, the total cost of government assistance is estimated at $12 million for the large majority of mines still accepting it.

Mines are to have an opportunity to elect with the beginning of any quarter of the year to seek buyers in the premium market. If they so elect they will be precluded from receiving any federal assistance during the rest of the calendar year.

FUMEALL*

TRADE-MARK

the superior filter fabric for fume, dust and liquid filtration

SUCCESS STORY NO. 2!

"Thanks for the assistance in our bag house... Top filtering of fine dust... high dust load... FumeAll has already doubled all previous bag life..." —From correspondence in our files.

What is FUMEALL?

FUMEALL is a combination of virgin wool and synthetic staple fibers. This combination gives the undisputedly superior filtering qualities of virgin wool plus the strength, heat, acid, alkali, and moisture-resistance of synthetic fibers.†

How long does FUMEALL last?

In actual operations, **FUMEALL** is lasting 4 times as long (and in many instances much longer) as conventional all-wool filter fabrics.

How much does FUMEALL cost?

The initial cost of **FUMEALL** is little more than any good all-wool filter fabric. Yet when measured in terms of longer life and superior performance **FUMEALL** costs far less.

How resistant is FUMEALL?

FUMEALL operates successfully in temperature ranges far beyond those permitted by conventional all-wool filter fabrics (225° to 300°), has greater fire-resistance than most synthetics. In intermittent operations, moisture absorption of **FUMEALL** is 50% or less than that of conventional all-wool filter fabrics, and shows greater resistance to acids and alkalis present in various filtered fumes and liquids.

What is the porosity of FUMEALL?

You can get exactly the porosity you want with **FUMEALL**, the right weave for your specific requirements. At present, **FUMEALL** is available in 4 different weights from most porous 14-oz. to least porous 24-oz. Finer or coarser weaves are available on special order, and **FUMEALL** can be napped or unnapped to conform to various operating conditions.

What about FUMEALL sizes?

FUMEALL is "tailored to your needs". Portland Woolen Mills will weave yardage or fabricate bags to any size and specification.

FumeAll is proving highly satisfactory for vacuum filtration in drum, disc and leaf type filters as well as bag type filters. Write or send coupon for samples and details.

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Portland Woolen Mills, Inc.

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*Patent pending

†DYNEL—a product of Carbide and Carbon Chemical Division of Union Carbide and Carbon Corp.

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PORTLAND WOOLEN MILLS, Inc.
P. O. Box 2620, Portland 3, Oregon

Please send me additional details and samples of **FumeAll** suitable for
☐ fume collection ☐ dust collection ☐ liquid filtration

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

Ebensburg Coal Co. installation proves that

Belt reinforced with "Cordura" rayon trains well on long slope conveyor

12,000-pound tension has so little stretching effect on the "Cordura" rayon reinforced belt, above, that the counterweight moves less than one foot when starting with a loaded belt. This belt spans 1234 feet between centers and can carry 250 tons an hour. A 100-horsepower motor and mechanical speed reducer drive the belt 350 feet a minute up a lift of 266 feet. Inspecting the installation is Mr. T. L. Aitken, Vice President in Charge of Operations, Ebensburg Coal Co.

For nearly a quarter mile on a curved and varied course this 36-inch slope belt at the Ebensburg mine, Colver, Pa., trains perfectly. It was manufactured by Hewitt-Robins Inc. on a 5-ply fabric carcass made of Du Pont "Cordura"* High Tenacity Rayon.

Why do belts reinforced with "Cordura" rayon train better? For good reason: The inherent strength of "Cordura" rayon yarn enables manufacturers to make a belt thinner . . . with fewer plies . . . yet stronger. These thin belts are more flexible and sit firmly on the center idler whether loaded or empty, so they train better. They also have less tendency to crack and separate. And the low stretch of "Cordura" rayon saves expensive shutdowns for take-up and resplicing.

Before you order your next conveyor belt, inquire about the advantage of belts reinforced with "Cordura" High Tenacity Rayon. We'll be glad to send you the names of suppliers . . . also complete information about "Cordura" rayon, in a new booklet "Sinews for Industry." For your free copy write: Rayon Division, Room 4421, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U. S. PAT. OFF.

Du Pont "Cordura" High Tenacity Rayon

STRENGTH AT LOW COST

DU PONT

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BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

INTERNATIONAL PANORAMA

STOCKHOLM—Two important discoveries of uranium have been made in Sweden. Both are uranium mineralization in shale. One is at Kvarntorp west of Stockholm and the other at Oestergotland southwest of the capital city.

RENO—Kaiser Aluminum and Chemical Corporation has purchased the Baxter fluorspar mine of the H. W. Gould & Co. The Kaiser company will continue development and production at the mine.

HAVANA—The Nickel Processing Company has started operation of the Nicaro nickel plant. The World War II built plant has been expanded, additional ore reserves have been developed and capacity has been expanded to 30,000,000 pounds of nickel per year.

WASHINGTON—The DPA has announced a zinc expansion goal of 1,320,000 short tons of zinc by 1955. Of this 190,000 tons will come from new mines and plants.

SUDBURY, ONTARIO—The International Nickel Company of Canada, Limited mined a greater tonnage of ore underground in 1951 than in any year. Underground production was 7,780,000 tons of the total tonnage of 11,800,000.

WASHINGTON—During the first quarter of 1952 3,000 tons of rutile was withdrawn from the national stockpile to supply the welding rod requirements of defense industries.

HOBART, TASMANIA—Aberfoyle Tin N. L. has contracted to sell its entire output of tungsten to the British Ministry of Munitions for a four year period.

CARACAS—The M. A. Hanna Company and the Republic Steel Corporation are jointly forming a new company to purchase the Maria Luisa iron ore property.

LIMA—The Utah Construction Company, a leading independent United States iron ore producer, has signed an agreement with the Peruvian Santa Corporation for testing and possible mining of a large iron ore deposit. The concession from the government has a 20-year life.

FONTANA, CALIFORNIA—The Kaiser Steel Corporation has announced a $65,000,000 expansion program to raise pig iron output by 50 percent. Production of iron ore at the Eagle Mountain iron mine will be increased by major additions to equipment, facilities and housing.

SUDBURY, ONTARIO—Falconbridge Nickel Mines, Ltd. has signed a nine-year contract with the Defense Materials Procurement Agency for the delivery of 50,000,000 pounds of nickel and 1,500,000 pounds of cobalt. The metals will come from increased production from the McKin and Hardy mines.

IRON RIVER, MICHIGAN—The Cleveland-Cliffs Iron Company and the Ford Motor Company have formed the Humboldt Mining Company to mine and concentrate hematitic jasper. Two, 200,000 annual ton, concentrating units are to be built with first production scheduled in 1953.

MANILA—The Philippine Iron Mines, Inc. is to develop its Larep iron ore mine with shipments scheduled to Japan for use by three Japanese steel companies.

COBALT, ONTARIO—Penn-Cobalt Silver Mines is erecting a 300 ton per day zinc-silver-cobalt mill. It will be the largest mill in the district treating mine run ore.

WASHINGTON—The NPA has removed all government controls on the uses and consumption of lead. It is the first common metal with widespread industrial uses to be decontrolled.

BEAVER BAY, MINNESOTA—The Reserve Mining Company is planning to increase capacity of its projected Beaver Bay taconite plant by 50 percent. Total plant capacity is now projected at 3,750,000 annual tons of concentrate.

BOISE—The Idaho Beryllium & Mica Corporation has been awarded a $125,000 production loan from the Reconstruction Finance Corporation for its Muscovite mine at Deary. Beryl and scrap mica will be recovered.

OSLO—A/S Titania is making plans for the construction of a new pig iron plant at Sokndal. The plant will use magnetite concentrate, from which ilmenite has been removed, as a source of iron units.

FARRELL, PENNSYLVANIA—The Sharon Steel Corporation has rolled titanium alloy for the first time at its Roemer works. The new aluminum-chromium-titanium alloy was rolled on a steel-strip hot mill.

GUM SPRINGS, ARKANSAS—Reynolds Metals Company is planning to build a new aluminum plant here at an estimated cost of $30,000,000. First aluminum is scheduled for production in early 1953. Annual capacity of the plant will be 55,000 tons.

SAO PAULO, BRAZIL—The new electrolytic copper refinery now under construction at Utinga, Sao Paulo state is due to start operations during 1952. It will treat concentrate from Camaqua mines in Rio Grande do Sul state and imported ores and concentrate, possibly from Bolivia.

LONDON—The Ministry of Materials has sold 30,000 tons of lead to the United States. Delivery will be made during the next four months.

BELGRADE—Present expansion projects at the Bor copper mine are costing 1,000,000,000 dinars (one dinar = $0.0033). The capacity of the electrolytic refinery is being raised 250 percent with expansion completion scheduled by August 1st.

ALBUQUERQUE—The Acoma Indian Tribal Council has signed a uranium prospecting agreement with F. A. Sitton, prominent Colorado uranium miner. Sitton will prospect the 223,000 acre reservation, and have first mining rights.

DULUTH—Plans are being made to ship 96,000,000 gross tons of iron ore by Lake Superior vessels during the 1952 shipping season.

OTTAWA—The Canadian government has extended the "cost-aid" gold mine program for two more years.

Electrolytic Zinc Plant Starts at Cerro de Pasco

Cerro de Pasco Corporation's new electrolytic zinc plant at La Oroya, Peru has been in operation since February. Rated capacity is 35 metric tons per day of Special High Grade zinc.

The plant was designed to treat marmatitic concentrate containing 47 percent zinc from the Paragsha concentrator of the corporation. Two wedge-type roasters produce calcine for leaching, which is followed by neutralization of the solution, filtering in Burt rotary filters, purification of the solution with zinc dust, and electrolysis of the purified solution. Nine blocks of 20 cells each, or 180 cells, in series are available for electrolysis. Current density is 60 amperes per square foot of cathode surface. Two banks of Westinghouse mercury arc rectifiers, in parallel, supply direct current at a maximum of 5,000 amperes and 650 volts. Stripping of zinc sheets from the aluminum cathodes is done on a 12-hour schedule. These sheets are then melted in two low-frequency Ajax induction furnaces and cast into slabs, the great majority of which will assay 99.99 percent zinc.

An extension of the Paragsha concentrator is under construction in order to increase the output of zinc concentrate. The lead concentrate will be treated in new lead smelting facilities now under design. Sufficient lead refining capacity is already available. Irving L. Barker is general superintendent of smelting and refining.

Guatemala to Provide Pig Lead for U.S.A.

A contract signed by the Compania Minera de Huehuetenago of Guatemala City, Guatemala, and the United States Defense Materials Procurement Agency will provide an additional 26,250 tons of pig lead for U.S. defense purposes within five years.

The company will finance a $400,000 expansion program at its lead mine in the Huehuetenago district of Guatemala. Included is construction of a flotation mill, housing, roads, and mining facilities. Completion is expected within two years.

Delivery of the pig iron would begin in 1954 with an estimated average annual production of 5,250 tons. Delivery will be f.o.b. shipboard in Guatemala ports, and the price paid will be the current New York market quotation, less all shipping, refining, and related costs. The contract specifies that the price will be no less than 17.342 cents or more than 20.342 cents.

Termination of the contract will be made when a total of 26,250 tons have been delivered or by June 20, 1959, whichever is earlier. The pig lead must be at least 98 percent lead, and will be refined in the United States.

The Oswaldo headframe (No. 2) is all-steel, and is painted a heat-reflecting silver. Cylindrical steel ore bins are attached to it.

Underground engineer, Howard "Scotty" Wilmeth, mine foreman, Oliver Duggan, and Paul E. Keeney take a look at N339 stope near the Oswaldo No. 1 shaft. This stope is a mine in itself: 112 feet high, 200 feet long and 80 feet wide.

KENNECOTT'S OSWALDO ZINC MINE

A traditional copper mining company, Kennecott has developed a rich new selective zinc mine north of the great Santa Rita open pit

On the slope north of the town of Santa Rita, New Mexico, and less than a mile north of Kennecott Copper Corporation's great Santa Rita copper pit, stands a silver-painted headframe that marks a new departure in Kennecott mining activities: The Oswaldo unit is an underground, selective, zinc mine; it's the only zinc mine that Kennecott operates; and as a type, it is a far cry from the company's usual operations —huge open-pit and block-caving on porphyry-copper deposits.

The Oswaldo is now producing approximately 400 tons of ore a day. It is a comparatively young mine, just recently developed for production, and is a new and important source of zinc. The operation is included in Kennecott's Chino Mines Division, and is thus under the general supervision of general manager W. H. Goodrich, assistant general manager F. C. Green, and superintendent of mines G. J. Ballmer. Underground engineer H. A. Wilmeth supervises the Oswaldo underground mines and Oliver Duggan is underground mine foreman.

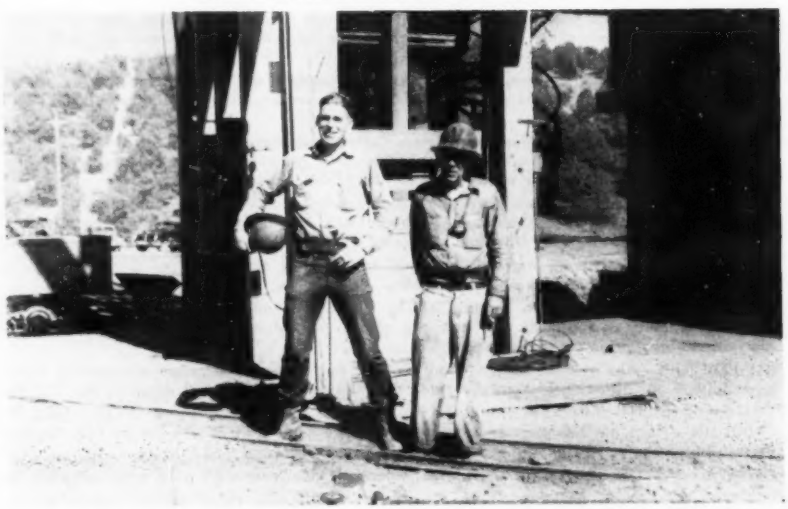
Streamer of Contact Ore

The first Oswaldo unit was started late in World War II when demand for zinc was at an all-time high, and this original 3-compartment shaft was sunk then to explore relatively shallow ores. The ore, mainly at 300 to 400 feet of depth, was along contacts between the 100-foot-thick Hanover limestone and steeply dipping granodiorite dikes known as a Birdseye porphyry.

The zinc ore is localized in the vicinity of the limestone-porphyry contact and is further localized by a series of steeply dipping small fractures which cross the contact.

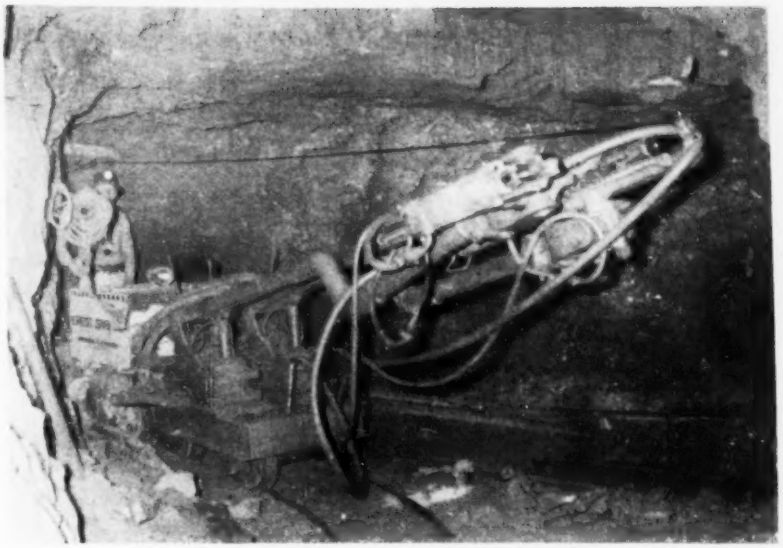
Above the Hanover zone, and

Underground engineer, Howard "Scotty" Wilmeth and mine foreman Oliver Duggan have just stepped from the cage in the Oswaldo No. 1 shaft. They went below at the Oswaldo No. 2 and walked nearly a mile underground.



usually forming the back of the ore, is the Parting shale, a thin-bedded 25-foot-thick shale which spalls readily when it is exposed to the air. The contact between the unaltered Parting shale and zinc ore is nearly always separated by a two- to four-inch layer of altered sediments, mainly comprised of garnet and epidote and associated minerals.

The ore-bearing mineral is sphalerite, and it varies in color from black (the blackjack variety) to light amber (the resinjack variety). Many ore zones show strong evidence of secondary enrichment; in several zones, crystals of specimen ore have been found. The ore varies in grade so that by proper selection of mining zones and methods, a rather uniform overall tenor can be maintained.



Mine foreman Oliver Duggan trams a Gardner-Denver hydraulic two-machine jumbo into W325N drift. The jumbo mounts two Gardner-Denver CF-79 drifters on 48-inch aluminum shells which allows for one steel change to five feet of drilled depth.

Two-Shaft Development

Extensive exploration through the ensuing years showed that ore structure persisted easterly for more than a mile, and in this new area substantial reserves of zinc ore could be mined from a level established at 600-foot depth. This was the site of the No. 2 shaft.

In 1949, the Oswaldo ores were mined only from the No. 1 shaft. Management studied the overall picture of the deposit—a deposit roughly outlined but by no means plotted in detail—and chose the almost classic two-shaft system of development. The Oswaldo No. 1 shaft, a 3-compartment shaft, could be used as a service-ventilation shaft; a new shaft, the Oswaldo No. 2, was to be sunk for hoisting and production; and a connecting level, the 600-foot level, was to be driven below the bottom of the known ore as the main ore haulageway.

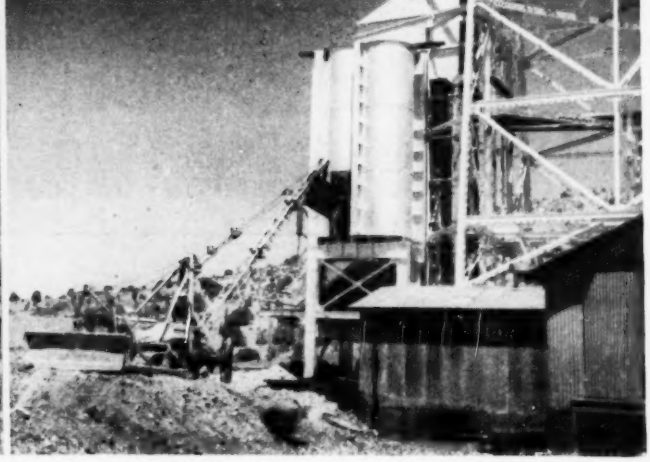
Accordingly, in 1949, the Chino Mines Division contracted with C. S. Elayer to sink a 3-compartment production shaft at a point one mile east of the old No. 1 shaft, and to drive 1,100 feet of 7- by 9-foot drift to connect with the No. 1 mine workings on the 600-foot level. Elayer completed the Oswaldo No. 2 shaft in 1950, holed through the connection on the level in late 1950, and in April of 1951 the Oswaldo No. 2 unit began production as planned.

Shaft Equipment

The No. 2 shaft was equipped with a permanent steel headframe for counter-balanced hoisting of ore by skips. The all-steel-and-concrete hoistroom houses a Nordberg double-drum hoist which is rated at 835 feet per minute pulling nine tons. The hoist is powered by a wound-rotor General Electric 400-hp induction motor; the rotor was specially rewound for the duty it is performing.

Electrical control for the hoist is by the Westinghouse relay-and-resistance system. The motor drives a Nordberg single-reduction gear unit which in turn drives the hoist that is equipped with Roebling 1⅛-

LEFT: Jesus Candelaria cleans track with a GD-9 mucking machine. This picture was taken near the entrance of N339 stope, an open stope which is the largest in the Oswaldo unit. RIGHT: This Caterpillar D8, equipped with a Hystaway, serves multiple duty—as a crane, bulldozer and excavator. Here shown is operator Lee Bateman picking up a prefabricated section of 5/16-inch steel plate, passing it into an orebin, where it will serve as a divider. Helpers A. Wesley Walker and J. C. Luna are watching.



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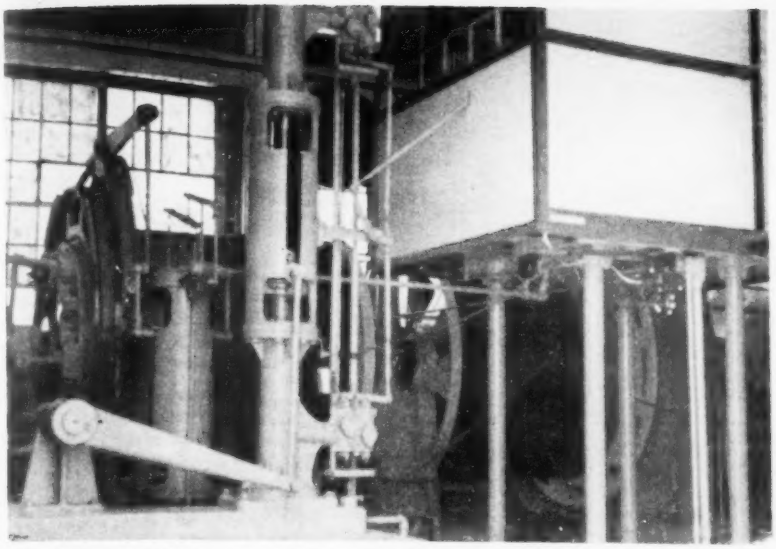


This Nordberg double-drum hoist serves the two hoisting compartments of the Oswaldo No. 2 shaft. The operator sits in the elevated, insulated booth at the right which overlooks the entire hoisting operation.

inch 6 by 19 Long-lay rope. The skips, each of which carries a five-ton payload of ore, were designed and built in the shops at Chino Mines Division; they are overturning skips which dump directly into either waste or ore compartments of the 300-ton bin installed as a part of and supported by the headframe.

Each of the three compartments of the No. 2 shaft is 4.5 by 5.0 feet in the clear. The No. 3 compartment accommodates a manway, pipe column, water, air, and electrical lines.

Drifting Procedure

Miners drive main drifts (including the 600-foot level) with a Gardner-Denver hydraulic jumbo which mounts two CF-79 drifters on 48-inch aluminum shells. The shells allow for drilling to a depth of five feet with one change of two-inch round steel; Timken carbide-insert bits are generally used.

The 7- by 9-foot drift on the 600-foot level was driven using a 28-hole horizontal-wedge cut; the round was chosen for its effectiveness and for the ease with which it could be drilled using a two-machine jumbo. Miners loaded the holes with an average of five to seven sticks of Apache No. 4 Amogel and detonated them with electric caps. The drift is equipped for haulage with 20-pound track laid at 18-inch gauge.

Using Gardner-Denver GD-9 mucking machines, miners mucked the round into one-ton, C. S. Card, end-dump, turntable-type cars. The 10-car strings were trammed to the station by a Mancha Little Trammer equipped with Edison cells.

Untimbered Stopes

The contact deposit consists of a series of individual orebodies that vary in shape, size, and height above the 600-foot level; these characteristics are never fully known until the orebody has been mined. So the plan of mining is kept flexible. Various orebodies have been extracted by sublevel-open stopes, shrinkage and other untimbered stoping methods. The mining marker at the back of most stopes is the layer of garnetized shale, and when that layer is left in place, the unaltered Parting shale above is not exposed to air and the back remains firm and safe.

Drilling in the stopes is done with Gardner-Denver R-91 stopers. For sampling, small "rooming-out" work, and other light jobs, a 22-pound Cleveland H-22 machine has proved easily portable and surprisingly productive.

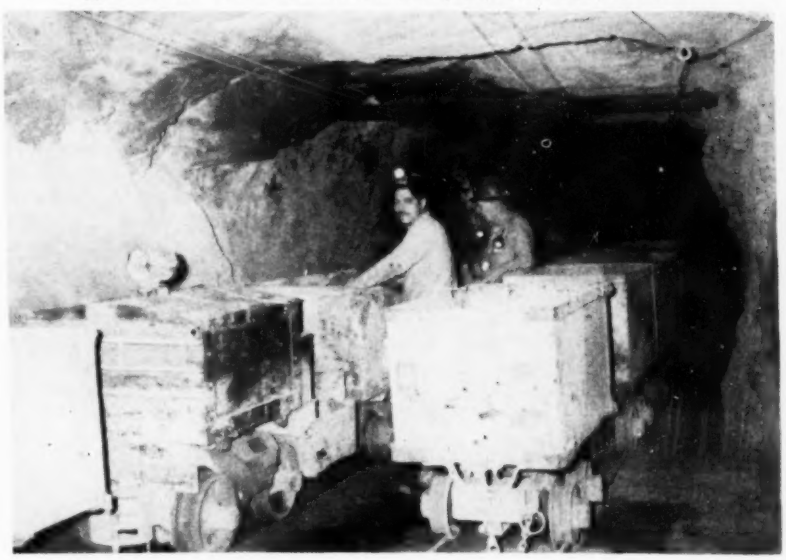
One piece of equipment that is common to most stopes is the scraper. Stopes are generally flat-bottomed, so that ore will not flow to chutes by gravity. At the Oswaldo, several Pacific Slushmaster scrapers are in use; they are used to cross-slush, to scrape into conventional chutes, and at times to scrape the ore to small loading ramps so that it flows directly into a waiting car.

Ore to Deming

Trammed to the station, ore is hoisted through either shaft. The Oswaldo No. 1, where cars are caged, is now being worked to near capacity at about 250 tons per day. The Oswaldo No. 2, with skip hoisting, is now producing about 150 tons per day, and has capacity for hoisting additional tonnage. From chutes at either headframe, the ore is trucked to an AT&SF siding where it is loaded into railroad gondola cars and shipped to American Smelting and Refining Company's and Peru Mining Company's custom mills at Deming, New Mexico.

The Oswaldo, nearly ready for production at the close of World War II, is an important, and very welcome, addition to postwar zinc production.

It's caging time at the Oswaldo No. 1 shaft. The string of one-ton Card cars on the left are full; those on the right are returning empties. Mucker Emilico Cordovo; mine foreman Oliver Duggan; and shift foreman Gavino Gallardo inspect part of the day's production.



Strapping a load of mine timber in the saw mill. Timber is piled, for bundling, in the proper size for underground transport.

By Robert L. Haffner

Assistant Mine Foreman
Bunker Hill & Sullivan Mining and Concentrating Company
Kellogg, Idaho

HOW BUNKER HILL MECHANIZED TO IMPROVE MATERIALS HANDLING

The mine labor situation is serious, both from a shortage and cost standpoint, as well as that of efficiency. With this in mind, Bunker Hill & Sullivan Mining and Concentrating Company, like many companies, has been forced to institute new and different methods of handling materials, the greatest bulk of which is timber for underground use. A description of the flow of this material, from the sawmill to the stope, gives a graphic picture of materials handling methods in use at the present time.

Timber, delivered by truck and railroad flatcar, is unloaded beside the sawmill and framing shed. A traveling hoist, mounted on the adjacent hillside, picks up the logs and "decks" them for storage until they are needed. A second storage area, a short distance away, takes care of any overflow. Here, the logs are dumped over a shallow bank, to be reloaded, later, by a jammer.

Between the two saw mills, and serving each, is a log pond, which is kept full by a fork-lift truck. The logs are drawn from the pond, up into the mills by a log chain and rolled onto a platform, to be cut in a standard fashion by jigs common to most plants. Previous to changes in the materials handling program, the cut timber was taken, by hand, from the rolls and log chains and loaded on standard mine timber trucks. The timber train, when made up, was then switched to the mine yard where the material was unloaded and stored.

This system, with its track to maintain in winter and summer, costly labor, and old equipment, was inadequate for the job and thus became the focal point of our improvement program.

At present, we have installed a green chain—"green" for green timber—to alleviate the "take-away" bottleneck at the mills. This consists of two drive-type link chains with drive sprockets on a common shaft, and powered by an electric motor. The chains, running in wooden guide slots on a steel track, are spaced apart to suit the timber bundle size for underground handling. As the timber comes from the saws, it is loaded on two "sleepers" thrown across the chains. When a 3 by 3 foot bundle is stacked, the loaders, by means of a hanging switch, move the chain and load to make room for the next pile. A short distance ahead, the loads are banded and thus are ready for delivery. The green chains of both the sawmill and framing shed extend out of the building to a loading dock, where the loads are picked up by a fork-lift truck and stacked on a flat-bed truck for delivery to the mine yard. The latter eliminates the expensive mass of yard trackage.

The sawmill has two chains in use—one for usable waste material or timber for which there is no great demand, and the other for finished articles such as short and long girts, or caps that have to be framed. The latter is transferred without banding to the framing shed by the fork-lift truck and set on an ingoing extension of its green chain.

The flat-bed truck is unloaded in the mine yard by another fork-lift, loading the mine trucks directly or stacking the bundles on pre-determined areas of a concrete apron. Making up supply trains and yard switching is done with a Plymouth gasoline "dinkie", doing away with trolley except for the main line.

Bundled Timber Handling

Loaded timber trucks are hauled underground to the No. 2, or service, shaft by empty ore trains, and there switched off for unloading. The handling of the strapped bundles of timber in the shaft is very simple and efficient, requiring the use of only one man on top for loading and one man below for unloading. The

shaft is inclined at an angle of 41° and has two hoisting compartments. At the collar, an I-beam is hung from the back, parallel to, and directly over each compartment. A three-ton air hoist and chain crawl are attached to each of these girders, traveling from directly over the shaft to the rear of the station. Under the I-beams and at right angles to the station is the siding track on which the loaded timber train is switched.

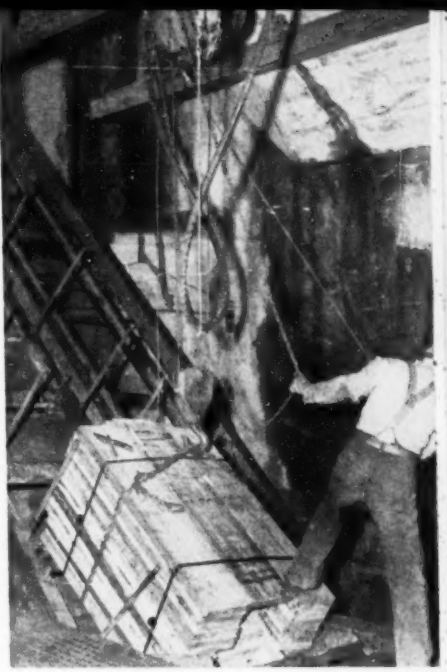
As the bundled loads of timber are pushed in front of the shaft, a chain is thrown around the load and the air hoist lifts it from the truck. By either pushing or using the crawl, the load is moved to a spot above the waiting skip, swung into position and lowered. The hoist hook is freed, leaving the cabin in place for the unloading operation. The skip is 20-feet long, and carries four, five-foot bundles, or the equivalent in longer timber. Standard practice in unloading is to stop the loaded skip short of the station floor where the raised hook of the air hoist is slipped under the chain of the top load. The skip is signalled down and out from under the hooked load, which is then moved along the I-beam to a waiting timber truck. This is repeated until the skip is emptied and released.

The bulk of the material handled in this shaft is unloaded on three levels, 19, 21, and 23. On these levels, the loaded trucks are made up into a train and hauled to smaller service shafts where identical loading and unloading procedure is followed, with one exception: the stoping levels use chain hoists for unloading, instead of the air motor type. Loaded timber trucks on the working levels are hauled to the stope raises where the bands are cut from the loads and the timber skidded down into the stope.

Long Pieces Easily Handled

Rails, 30 feet in length, special long timber, and any other oddly shaped loads are handled with ease and efficiency using this system, or a variation of it, to suit the article. In general, the limiting size of any load is 3 by 3 feet in cross section. As stated before, all materials to go down this shaft are handled by one man on top and one below.

Anything to be banded is strapped before going into the mine—30-foot rails with five in a bundle, pipe, switch ties, chute lips, drift sets, to name a few, in addition to the strapped posts, girts, lagging, etc. Unbanded material consisting of wedges, blocks, powder, and other freight items, all of which must be handled somewhat individually are loaded into tote boxes. Steel picks, and pinch bars are handled in steel buckets.



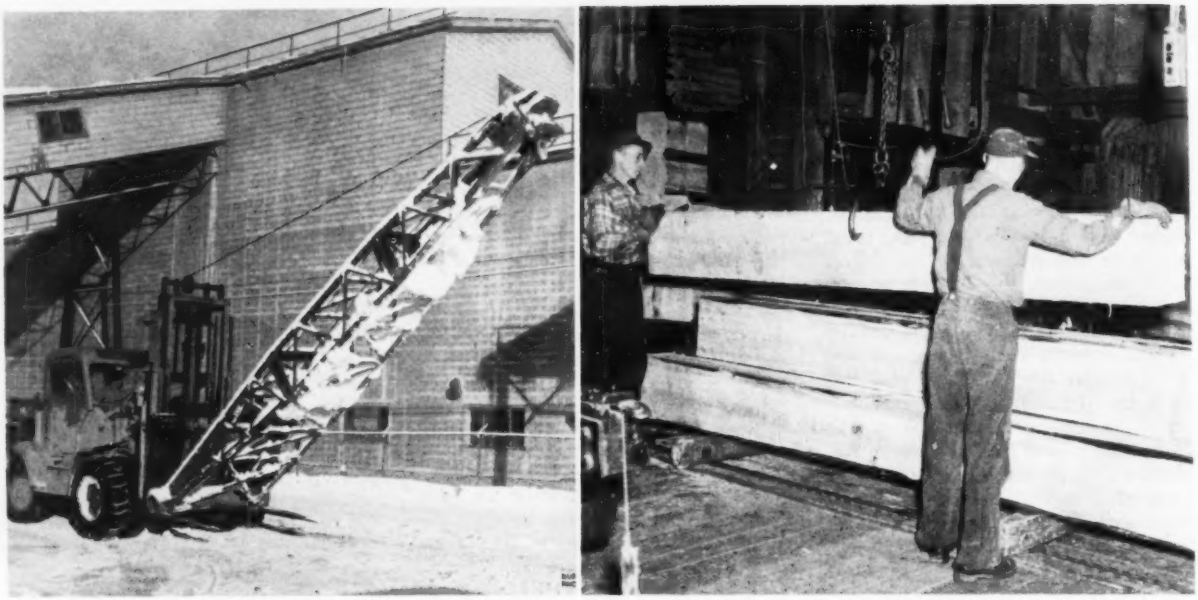
A bundle of lagging is loaded onto the skip at the collar of the No. 2 shaft.

Band-Power Hoist-Fork Lift

Three integral features of the Bunker Hill system of handling materials, that of banding, the use of power hoists, and the fork-lift truck, are finding increasingly wider uses and importance throughout the surface plant.

Besides contributing to the ease of

The tote box made for snow removal is dumped into a waiting truck. Note the auxiliary timber storage in the background.



LEFT: Hoist-equipped lift truck with the shop-constructed boom attached. RIGHT: Stacking cut timber on the green chain.

handling large loads underground, banding has also facilitated the storage of materials in the mine yards. When used in conjunction with the yard fork-lift truck, it has provided an ample storage of timber, by high stacking, sufficient to overcome any surge from the sawmill and framing shed. The banding of construction materials is another important use, such as strapping roof sheeting into bundles for lifting into place.

The application of power lifts in the underground operation is restricted to those levels where the quantity of material to be handled merits their installation. All are of the air-motor type. In the surface plant, three types of lifts are in use —air motor, air cylinder, and electric hoist. The first two are used in the sawmill to elevate material and to transfer finished loads. Their importance here is minor, however, in contrast to that of the green-chain, fork-lift combination. Excellent application is made of the small electric hoist in the machine shop and electrical shop. All of the large lathes are equipped with a swinging I-beam, electric hoist, and crawl assembly to handle and accurately position heavy materials. With the exception of one, five-ton, air-motor lift in the machine shop, all shop hoists are of the electric type.

Versatile Fork-Lift Trucks

The fork-life truck, although having no direct underground use, has rapidly become the most versatile of any of the yard equipment. The company has three of the small type, each confined to a specific area or job. One operates at the sawmill and framing shed serving the green chains and shuttling between the two mills with sawed materials that are to be framed. The second unloads banded timber in the mine yard and loads the timber trains for the mine. The third is stationed in the machine shop for inter-use with the electrical shop. Its function becomes increasingly important as new uses are found for it—high stacking of materials, moving of heavy repair parts, lifting of mine locomotives from the track, and a host of other jobs. It is significant that our new machine shop, enclosing all but the electrical and steel shop, has not a foot of track in it—all placing of heavy equipment and the subsequent servicing of this equipment is done with the fork-lift truck.

In addition to the three small trucks, the Bunker Hill owns two of the larger, nine-ton type, which are used for general purpose work throughout the plant. These husky machines are in constant use at one place or another. They move and place concrete pipe, cable reels, transfer heavy equipment, move ball mill liners and balls, in fact, anything that the forks can lift.

Accessory Items Add Uses

To increase the versatility of these machines, several accessory items have been constructed. There are several types of tote boxes of three- to four-yard capacity that can be spotted and left to be filled with scrap, dirt, or whatever is to be loaded. For concrete work, a bucket of about one-yard capacity has been built to be used for pouring into elevated forms. It fits on the forks and has a lip and gate arrangement. One of the larger fork-lift trucks has, as special equipment, a small hoist mounted directly behind the telescopic lift and run by a power take-off from the motor. For use with this truck, tote boxes are constructed with an independent chassis to engage the forks and hinged to the box proper at the front. This permits the lifted box to be dumped by hoisting the rear of it with the cable. A special variation of this box is made of light steel with an open front and a depressed lip. This has proved to be a very efficient snow remover, particularly for the "middle of the road" pile left by graders. The lift truck rams the box into the pile, tilts back and lifts the load, carrying it away for dumping.

Also constructed for use with the fork truck and hoist combination is a large boom. This boom, of girder construction, rests in the angle of the forks and is supported by cables running back to the vertical frame of the lift. The angle of the boom is adjustable through a chain and slot arrangement. The cable of the hoist leads over a pulley at the top of the vertical rack, and out to the sheaves at the end of the boom. This piece of equipment has many uses, from placing scaffolding to pouring concrete with the previously mentioned bucket. It can utilize the lift of the forks as well as its own height to give an overall lift of about 20 feet.

Standard Equipment Used

The equipment used in the materials handling program, with the exception of the accessory items described, is all of standard manufacture.

There are three green chains in use; two in the sawmill of 42-foot and 115-foot centers, and one in the framing shed with a 200-foot length at centers. The chain is of Link-Belt or Rex-Chabelco construction, with a 2.609-inch pitch, an allowable chain pull of 2,300 pounds, and an ultimate strength of 20,000 pounds. Its weight is 2.5 pounds per foot. Sprockets for this chain have a 11/72 pitch diameter and 14 teeth. The drive mechanism consists of five-hp. gear motor, with a speed of 45 rpm. on 440 volts. 3-phase, 60-cycle current. With a roller chain drive from the motor to the driven sprocket, at a sprocket ratio of 3:1, the chain moves at a speed of approximately 47 feet per minute.

The air motor hoists used are all of standard Ingersoll-Rand equipment, and range from two-to five-ton lifting capacity. The air cylinder lifts are of Bunker Hill construction, and have been replaced by the air motor or electric type wherever necessary. In the machine shop, Yale, Midget King, one and two electric hoists are standard. Five of these are mounted on mono-rails and three on jibs over the lathes. In addition, there is one General Electric three-ton, and one Ingersoll-Rand five-ton hoist mounted on mono rails. The electrical shop has one two-ton Yale hoist on an I-beam, one five-ton Shaw bridge crane, and two two-ton Shaw "Load Lifter" hoists. The latter is also of the bridge type.

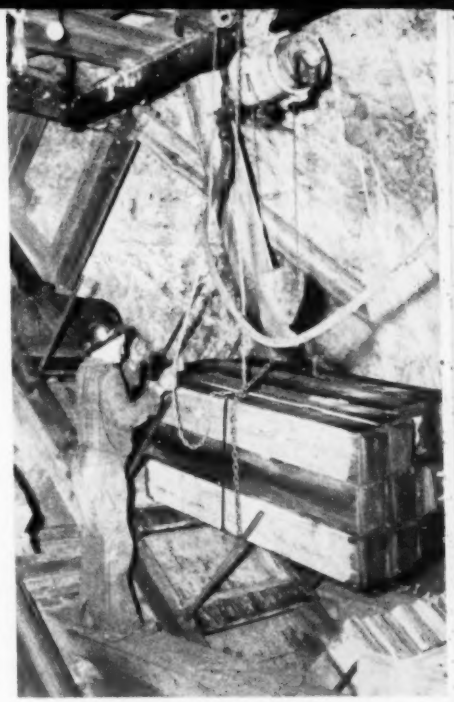
Banding equipment is rented from the Acme Steel Company who also supply the strapping. These tools are very portable, and are sent by the company to outside sawmills to band any timber that has been ordered by the mine. The bundles are of the correct size for immediate use. The gauge of the steel banding material has recently been changed from 0.035 to 0.028 inches, giving us an estimated 15 percent increase in footage per pound of the three-fourths inch width.

The Yale and Towne Manufacturing Company has supplied three small fork-lifts, the "Yard King 40." This truck has a capacity of 5,000 pounds with a 15-inch load center, 4,000 pounds at a two-foot load center, and a maximum lift of 124 inches. It travels with a governor-controlled speed of 13 mph, powered by a 65 hp. six-cylinder gasoline engine.

The larger lift trucks are of the Ross Carrier Company manufacture. They are rated at nine tons lifting capacity with a 26-inch load center. The maximum lifting height is 10 feet, with a travel speed in forward and reverse 25 mph. The gasoline motor has six cylinders, and is rated at 75 hp.

New Ideas Make New Uses

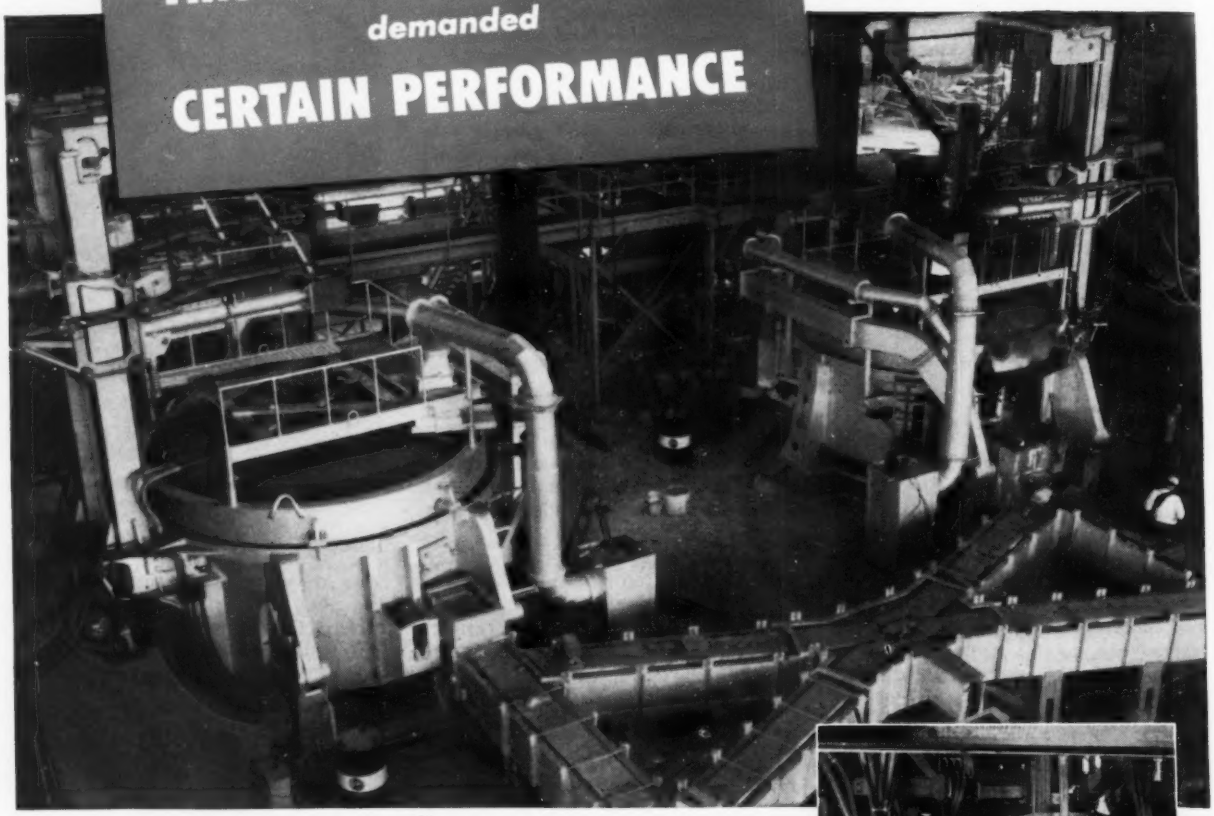
The materials handling program at the Bunker Hill is by no means completed. While there has been a very measurable improvement over the past, both in costs and in efficiency, new ideas and methods are constantly being worked on. In the overall picture, one point stands out, and that is that the value of the fork-lift truck cannot be underestimated. New uses are constantly being found for it; in fact, as Mr. Stevenson, the head of our surface engineering department, has said, "Every blamed carpenter wants one to carry his tool box."



Unloading the skip in the No. 2 shaft with a power hoist.

LEFT: Unloading a bundle of timber in the mine yard. Note the gasoline-powered yard "dinkie" at the left and the bundles of timber in the storage area. RIGHT: Loading a mine supply train. Wedge or block tote box on the truck at left.

This Continuous Process demanded CERTAIN PERFORMANCE



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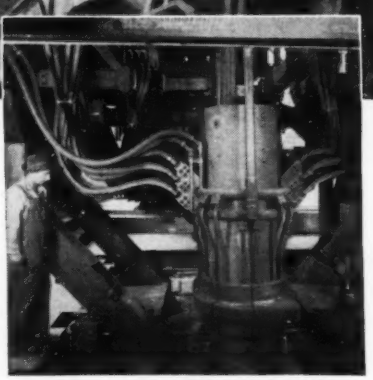

A typical 1500-KVA Lectromelt smelter at charging floor level. Three electrodes in line.

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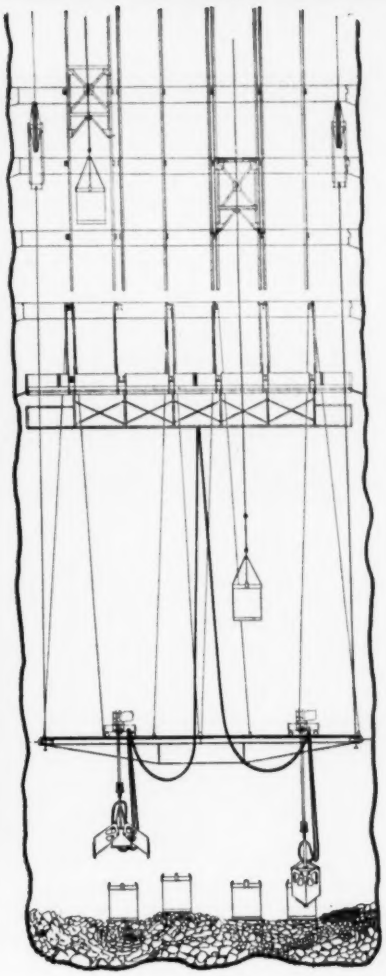
WHEN YOU MELT... MOORE RAPID *Lectromelt*



The grab digs into the muck pile at the bottom of an Orange Free State shaft. From time to time, fair amounts of water have been encountered in the shafts. The grab works under conditions that would make hand mucking more difficult. Line drawing at right illustrates a typical cross section of a seven-compartment rectangular shaft in the Orange Free State. The operating platform is suspended from the shaft sets and carries two traversing carriages to control the mechanical grabs.

"GRAB" SPEEDS SHAFT SINKING

The Anglo American Corporation developed and now uses a mechanical mucker to reduce man shifts and speed the sinking of deep Orange Free State shafts

Gold production has started in the new goldfields of the Orange Free State, Union of South Africa. Two of the 13 mines being developed there have already produced their first gold.[1] The remainder are completing, as quickly as possible, the initial program of shaft sinking, equipment purchasing and underground development.

As the chief gold-bearing reef (the Basal Reef) lies at a considerable depth at most of the mines, much attention has been given to the need to cut to a minimum the time spent on the essential, but unproductive and expensive, development period. In this direction a highly successful step has been the introduction of a mechanical method of shaft cleaning in the developing mines of the Anglo American Corporation of South Africa Limited's group.[2]

The equipment takes the form of a specially designed mechanical grab, developed by C. McLauchlan, manager of Western Holdings, Limited, in collaboration with E. A. Johns, resident engineer of Western Holdings, and H. B. Carlstein, resident engineer of Free State Geduld Mines, Ltd.

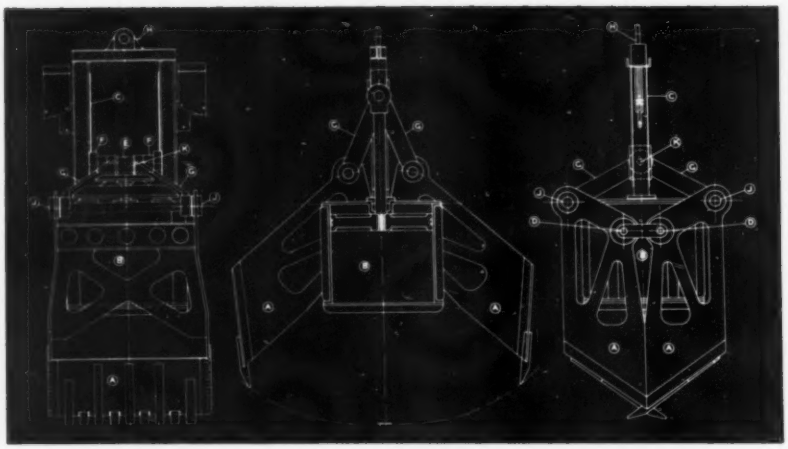
Mechanize For Faster Sinking

The factors which motivated this move toward mechanization were the constant threats of native labor shortages, and the possibility of achieving better rates of advance in shaft sinking.

In the orthodox method of shaft-sinking at mines under the technical control of Anglo American Corporation, three crews, each comprising 81 natives, are employed on a three-

1 "First Free State Gold Mill," *Mining World*, pp. 34, 35, 36, 37, 39, Jan. 1952. "Sir Ernest Oppenheimer Starts Welkom Gold Mill, Foresees £100,000,000 Annual Output," *Mining World*, p. 39, March 1952.

2 Western Holdings, Limited; Free State Gold Mines, Ltd.; Welkom Gold Mining Company, Ltd.; President Steyn Gold Mining Company, Ltd.; President Brand Gold Mining Company, Ltd.; Jeanette Gold Mines, Ltd.; and Loraine Gold Mines, Ltd.



Operating parts of the grab, jaws open (center), and close (right and left).

cycle basis. Of these, about three-quarters of the natives are used for mucking operations, the remainder also assisting in signalling arrangements, breaking up large rocks and changing the chains from empty to full buckets. After mucking operations are completed, approximately 40 to 48 natives remain in the shaft bottom for blowing over and drilling. By the use of the mechanical grab, almost the whole of the hand mucking operation is eliminated, only a small amount of hand mucking—between about five and 16 tons—being necessary after the grabs have finished. The saving in labor is thus great.

The saving in time arises from the relatively rapid working of the grab. The hand mucking in normal shaft-sinking procedure, to a large extent, sets the speed of sinking a shaft. Each mechanical grab clears the rock at the rate of about one ton per minute; as the natives working in the shaft are not previously fatigued by hand mucking they are able to contribute to the increased speed of cleaning the shaft after blasting.

Light, Fast, and Small

The chief considerations in designing the grab were to keep the weight as light as possible in order to permit fast operation; to restrict the overall dimensions so that the grab could pass through a shaft compartment; and, within those limits, to obtain as high a capacity as possible.

Mechanical grabs had been tested previously for cleaning shafts, but they had the disadvantages of heavy weight and cumbersome movement. In the grab designed by Mr. McLauchlan, the weight was considerably reduced by incorporating within the grab itself the opening and closing mechanism for the jaws. The jaws are operated by compressed air and are so designed that the maximum force is applied during the closing stages of the jaws.

The operation of the grab is explained by reference to the accompanying diagrams. The four main parts of the grab are the jaws (A); the cylinder (B); the guides (C); and the link arms (G).

The jaws are fixed to the cylinder by means of the pivots (D), which are equidistant from its center line and about nine inches from the top. The guides (C) are fixed to the top of the cylinder on the same center line and are provided with a cross-member at the top with a lifting eye (H) attached. A common shaft (K) is guided up and down by means of the G.M. shoes (F) and passes through the end of the piston rod (E) and the ends of the link arms (G). The other ends of the link arms are free on two shafts passing through the top of the jaws (J).

Compressed air is admitted to the bottom of the cylinder, forcing the piston up and lifting the common shaft (K) to the top of the guides. The link arms (G) being lifted into the upright position, draw the two shafts (J) together, causing the jaws to pivot at (D) and open. When compressed air is admitted to the top of the cylinder, the cycle of operations is reversed and the jaws bite into the material to be hoisted.

The cylinder is 30 inches inside diameter, and operating at a pressure of 80 pounds per square inch, applies a force equivalent to eight tons at the teeth of the jaws. This is sufficient to crush rock particles squeezed between the side plates on closing. The jaws have an open span of seven feet four inches and will normally gather a full load on

The grab opens and drops its load into an empty bucket. The loaded bucket on the right is ready to be hoisted 4,000 feet to the surface.

Comparison Between Mechanical Mucking of the Western Holdings No. 1 Shaft and Hand Mucking of the Western Holdings No. 2 Shaft

Item	*Western Holdings No. 1 Shaft Mechanical Mucking*	*Western Holdings No. 2 Shaft Hand Mucking*
Shaft depth at start of test	5,850 feet	5,820 feet
Footage sunk during test	548 feet	558 feet
Development footage in stations	396 feet	381 feet
Tonnage excavated and hoisted	34,833 tons	35,942 tons
Total native labor shifts (machine and mucking)	14,782 shifts	25,560 shifts
Total mucking man-shifts	4,061* shifts	19,260 shifts
Tonnage per overall shift	2.343 tons	1.365 tons
Tonnage per mucking shift	8.56 tons	1.87 tons
Percent delays due to cementation and support of bad ground	20.4 percent	14.6 percent

* Grab crews.

closing. Stability is ensured by the low center of gravity and the grab will close and open in any position taken during loading operations.

Two Grabs In Each Shaft

Two grabs are used in each shaft in normal sinking operations. The shafts are 46.33 by 10.0 feet inside the shaft lining. The grabs are controlled from traversing carriages, which move on an operating platform 46 by 10 feet, suspended about 25 feet above the bottom of the shaft. An operator rides on each of the two carriages and controls the longitudinal and transverse movements of the carriage, the raising and lowering of the grab, and the opening and closing of the jaws.

At blasting time the grab and the traversing carriages are hoisted and placed on trolleys. After the blast, the grabs and carriages are lowered into position and the work of cleaning the shaft bottom is started.

Mechanical mucking has been introduced in three of the shafts in Free State; they are the Free State Geduld Nos. 1 and 2 shafts, and Western Holdings No. 1 shaft.

A comparison of the results achieved over a period of four months by orthodox sinking employing hand mucking and those achieved by the use of mechanical grabs is given in the accompanying table.

Grab Not Slowed By Water

Conditions at the shafts were not quite comparable. No. 1 shaft, due to the constant intersection of wet fissures, was handling 10,000 gallons of water per hour, compared with 4,000 gallons per hour at No. 2 shaft. The greater percentage of this was caught in water rings frequently installed around the shaft perimeter, but the amount to be handled at the shaft bottom was always greater at No. 1 shaft.

In addition, the extremely fractured nature of the ground at No. 1 shaft necessitated the frequent installation of six-foot concrete strips just above the shaft bottom in order to stabilize the sidewalls. The inclusion of talc filling in the fracture planes of the rock complicated both the drilling and the cleaning at No. 1 shaft. The average drilling and loading times at this shaft occupied one hour and five minutes more than at No. 2 shaft, when the drilling and talc inclusion was only encountered during the last month of the test at No. 2 shaft, when the drilling and loading times were approximately the same at both shafts. No allowance has been made for these adverse conditions at No. 1 shaft in the overall comparison.

It must be borne in mind that design and construction were limited by several factors. The units used for traversing, raising, and lowering the grab were not designed from the drawing board upward but were available units around which the traversing gear was fabricated.

In addition, severe restrictions were imposed by the narrow compartments of the shaft which were ideally suited to hand mucking technique. Great care had to be exercised during the lowering and raising of the units and grabs through the shaft. The size of bucket was limited to a maximum capacity of 3.75 tons, which in turn governed the rate at which rock could be hoisted. The grabs were quite capable of filling buckets with a capacity of six tons during the travel and change-over period of the buckets.

Certain delays were experienced during the mucking periods, due mainly to fine grit finding its way into the traversing motor. This on occasion necessitated the removal of the carriage to surface and its replacement by a spare unit.

In the light of these experiences it is felt that with units specifically designed for the job and shafts having compartments large enough to accommodate buckets with a capacity of six tons or greater, mechanical mucking will be the accepted method of shaft cleaning in the future.

Acknowledgement

A description of the grab, the up-to-date table of comparisions between the sinking of the Western Holdings Nos. 1 and 2 shafts, and the illustrations for this article have been supplied through the courtesy of Mr. McLauchlan and the Anglo American Corporation of South Africa, Limited.

The wide opening jaws of the grab bite into broken rock at the shaft bottom.

Setting

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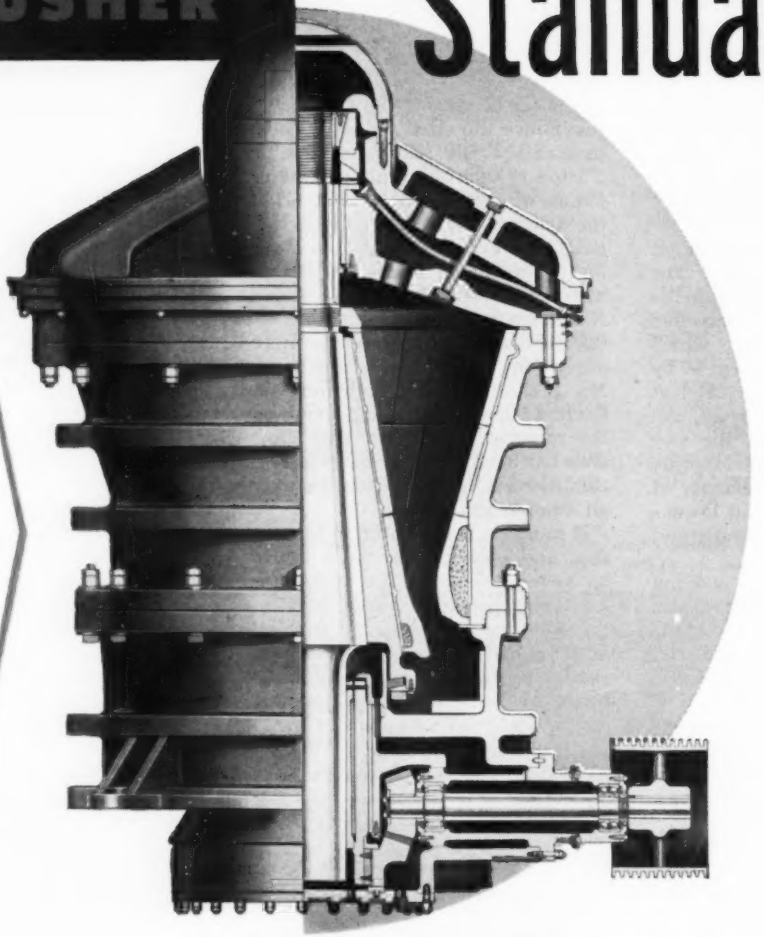

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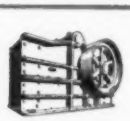
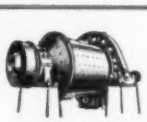


Jaw Crushers

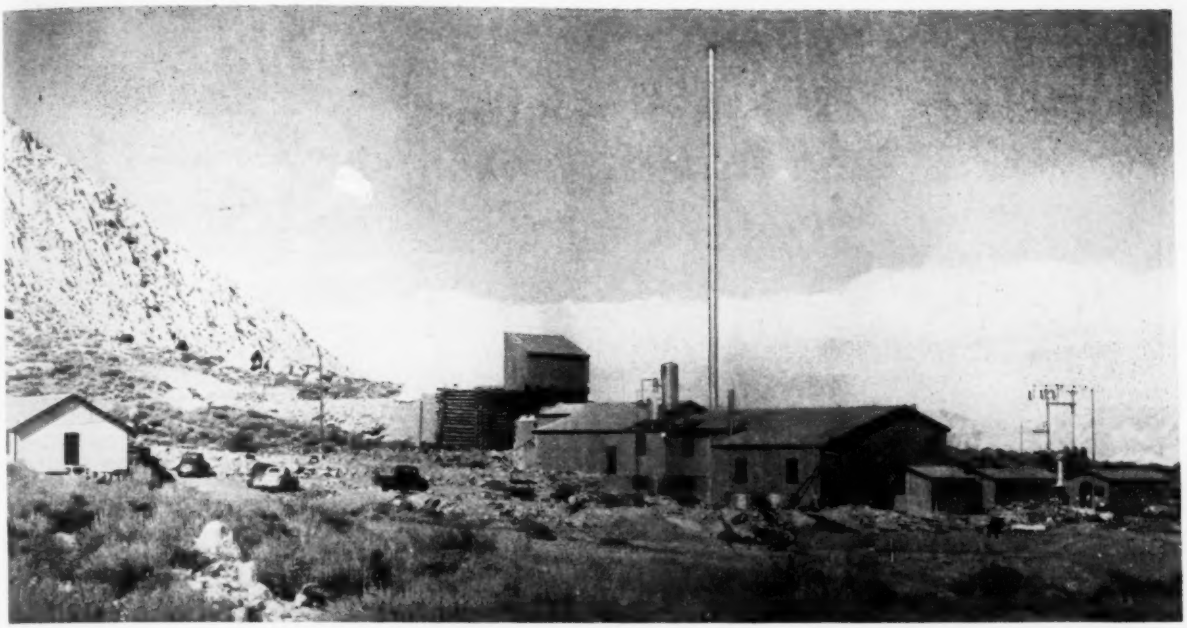
Gyratory Crushers



Grinding Mills

Vibrating Screens

Kilns, Coolers, Dryers



Initial single-reactor tungsten refinery built at Lower Scheelite, near Bishop, California. The plant's reactor and refinery successfully treated tungsten bearing material assaying only 2.50 percent WO_3 with a recovery of 93.0 percent. The pressure digestion system of tungsten refining was developed here in 1940.

HOW TO PRODUCE MORE TUNGSTEN

Integrated tungsten milling and chemical refining plants would create a market for low grade material and assure production from many new mines

By Blair Burwell

President, Minerals Engineering Company
Grand Junction, Colorado

The February 1944 issue of Mining World carried a report on the World War II Salt Lake City, Utah "synthetic scheelite" plant of the Metals Reserve Company.

Now, at a time when tungsten is again a key defense metal there are many inoperative tungsten mines as well as recently discovered large tonnage reserves of low grade tungsten material in Montana.

In this article Blair Burwell gives, for the first time, the metallurgical results and operating costs of the Salt Lake City chemical tungsten refinery. He is an internationally known tungsten expert and tungsten pressure digestion process patents are issued to him and assigned to the United States Vanadium Company. He sees the need for more chemical refineries as the basis for a permanent healthy domestic tungsten industry—Ed.

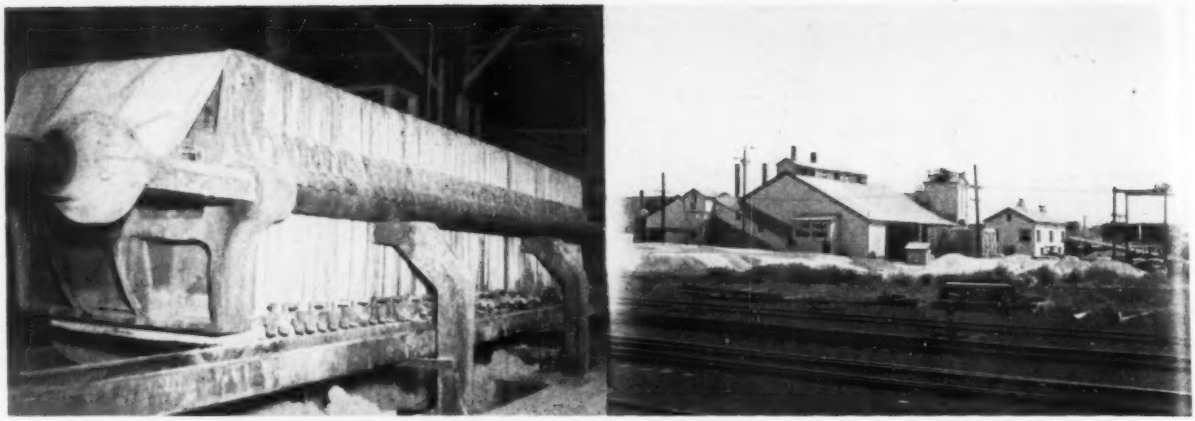
During World War II, the mining of tungsten in the United States developed into a healthy industry, which at its peak produced approximately 12,000,000 pounds of tungsten metal annually. This output supplied the largest part of wartime consumption at that time. Previous to 1940, American tungsten output was not a large part of world supply, amounting to 12 percent of the world's production compared to 37 percent by China and 17 percent by Burma.

One of the principal factors contributing to the growth of the domestic tungsten mining industry was the development of metallurgical treatment processes which, when used in combination with tabling and flotation, enabled the tungsten miner to recover a high percentage of the tungsten in low-grade ore and to produce a product low in impurities and high enough in grade to meet the market specifications of the tungsten consuming industry. As a result many low-grade tungsten deposits were developed into pro-

Table I

Rate of Monthly Feed In Units, Percent WO_3 in Feed, and Costs of Reagents and Labor Per Unit of WO_3 Treated at a World War II "Synthetic Scheelite" Plant

Rate of feed monthly in unit WO_3	*Percent WO_3 in Feed*	*Cost of reagents per unit WO_3*	*Cost of labor per unit WO_3*
2,600	3.32	$2.49	$1.64
3,600	4.16	1.84	0.93
7,500	5.40	2.61	0.86
7,800	6.03	2.34	0.74
6,000	12.30	2.51	1.56



LEFT: Conversion of the scheelite ($CaWO_4$) to a sodium tungstate solution (Na_2WO_4) in the digester is followed by two stages of filtering and repulping, after which the pregnant solution undergoes further purification in a Sperry filter press. RIGHT: The Salt Lake City World War II tungsten chemical plant shown here has been dismantled. Many of the tungsten mines whose operations were made possible by this plant can not operate today because there is no chemical plant to which they can profitably ship their concentrates.

ducing mines and the tungsten resources of the country were greatly extended.

The war ended at a time when the United States was becoming nearly self-sufficient in meeting domestic tungsten requirements. At that time large investments had been made in United States tungsten mines and treatment plants.

In spite of the protests and warnings of the industry, and many men in Government who foresaw the need of preserving this industry for future need, the domestic tungsten mining industry was forced to shut down at the end of the war when the price of tungsten declined to less than $20.00 per unit. This was the result of the unloading upon the United States market of war stocks of tungsten tool steel and tungsten products at salvage prices. Many thousands of tons of tungsten concentrates, which had been purchased at very high prices during the war from Portugal or other foreign countries to prevent their shipment to Germany, were dumped into this country at prices under $20.00 per unit; the absorption of this cheap tungsten effectively prevented the continuation of domestic tungsten mining. Metallurgical refining plants were dismantled and operating personnel scattered.

By 1951 much of the absorption of war stocks had been completed and the need for reviving the tungsten mining industry became evident when approximately 80 percent of world tungsten resources passed under the control of Russian-dominated countries or became vulnerable to interruption by sea attack. In recognition of this danger, the Government established a base price in 1951 of $63.00 per unit of tungsten concentrates of acceptable grade and minimum impurity specifications. It may be pointed out that the price of $63.00 per unit compared with the wartime $24.00 to $30.00 price is approximately proportional to the increase in the prices of base metals in the same period. As the tungsten mining industry competes for labor and supplies with the base metal industry, this price is not in any way a subsidy, but places the tungsten mines on somewhat of an equal operating basis, providing that the metallurgical structure of the industry can be restored and the tungsten miner can produce concentrates of sufficient purity to obtain the $63.00 price.

Table II

Tungsten Units Treated and Recovered, and Minimum and Maximum Percent WO_3 In Feed to a Single Rotary Reactor Plant

Item	*Figures*
Units WO_3 charged[1]	53,714
Units WO_3 recovered	49,836
Recovery	92.0
Average percent WO_3 in feed to reactor	4.5
Average percent WO_3 in tailings	0.12

[1] Low grade material from Mill City, Nevada.

Table III

Total United States Production, Consumption, and Chemical Treatment of Tungsten Measured in Pounds For the Years 1940 to 1944

Year	*Total United States Consumption*	*Total United States Mine Production*	*Production By Chemical Treatment of Low Grade Mill Products*	*Percentage Production By Chemical Treatment*
1940	9,555,000	4,872,806	804,000	16.4
1941	16,699,000	6,420,303	1,040,000	15.6
1942	17,389,000	8,977,575	2,270,000	25.3
1943	19,313,000	11,472,985	4,480,000	39.1
1944	19,165,000	9,764,647	3,390,000	35.0

Tungsten Marketing Problems

However, the small miner or new producer of tungsten, who is not equipped with intermediate chemical refining facilities to produce an industry salable product at this price, finds that he cannot market his low-grade product without a heavy discount or refining charge. The price of $63.00 means little to him because facilities for converting his mill products into finished concentrates, such as the World War II Salt Lake City tungsten refinery, have been closed and dismantled in the post-war period. The background of this present situation is contained in the following immediate history of the industry.

Prior to 1937 the users or consumers of tungsten had a plentiful supply of high-grade and high-purity concentrates. The source of the supply was either from placers, where the processes of weathering and washing had left a residual tungsten of high purity in the gravels, or from mining selectively favorable deposits low in molybdenum or other impurities. The ma-

jority of mines producing tungsten prior to 1937 "scalped off" a high-grade product of high purity by simple processes of tabling or gravity concentration, leaving a large part of the tungsten content of the ore in tailing piles for future treatment.

Examples of this are the early operations of the Nevada-Massachusetts Company at Tungsten, Nevada, where approximately 1,000,000 tons of tailing containing 0.35 percent WO_3 had accumulated from a tabling plant prior to the war, and the early Pine Creek operations at Bishop, California, where gravity concentration recovered 50 percent of the tungsten, leaving tailing piles of 0.30 percent WO_3 content.

About 1937 a reduction in the supply of high-purity concentrates from placer sources or from selective mining and milling began to trouble the tungsten consuming industry. It became apparent that intermediate purification was necessary in order to use offerings of tungsten concentrates from less pure sources.

Intermediate Refining

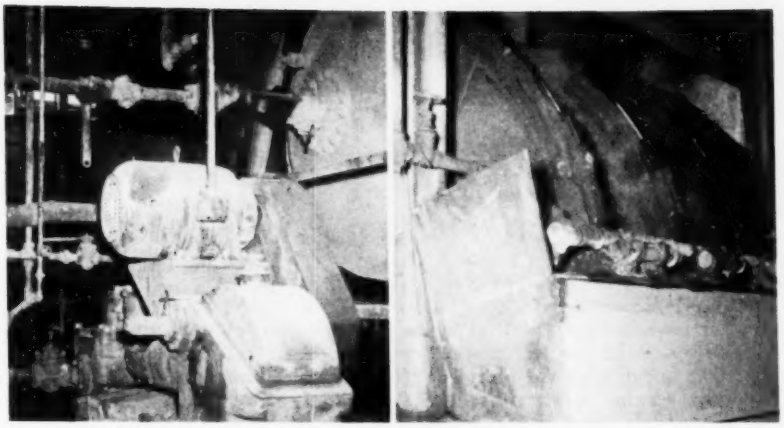
This situation resulted in the establishment, during World War II, of three separate types of intermediate refining of tungsten mill products to condition or prepare them for the market.

The first type of refining developed was pyrometallurgical refining, best typified by the Wah Chang Trading plant at Glen Cove, Long Island, New York. This evolved from the treatment of high grade concentrates, and initially included retabling or roasting, magnetic separation, acid leaching, and other combinations of treatment to remove tin, copper, arsenic, sulphur and phosphorous. This has developed into many variations, including pyrometallurgical decomposition or fusion methods to meet the great variety of ores presented to the eastern tungsten markets.

The principal feature of this type of refining is that it developed from and is best adapted to relatively high-grade materials where high concentration of chemicals used in fusion or roasting mixtures is offset by high tungsten content of the material treated.

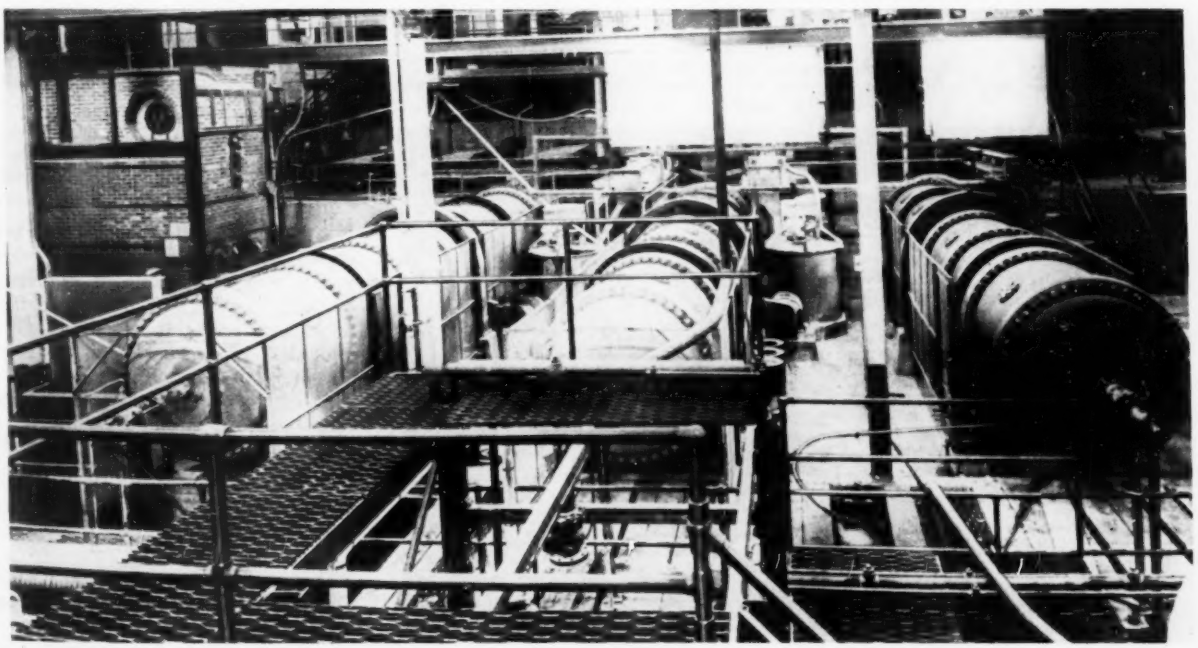
The second and third types have been developed as auxiliary hydrometallurgical steps in western tungsten plants to supplement the use of flotation in the milling of tungsten ores. In contrast to pyrometallurgical methods these types of treatment are best adapted to low-grade mill intermediate concentrates. These processing developments or types were:

The pressure digestion or pressure reactor process, using soda ash solution under heat and pressure to solubilize the tungsten and produce a chemical salt or synthetic scheelite. This is particularly applicable



LEFT: Low grade scheelite concentrate and soda ash are pumped into the feed end of the digestor, right, under a pressure of 200 pounds per square inch by the special pump shown in the foreground. RIGHT: Pulp from the digestor is filtered to remove the pregnant (sodium tungstate) solution. Filters are equipped with a steam blowing device to facilitate filtering the slimy digested pulp.

The pressure digestor (Patent Serial No. 425367-Burwell) is the key unit for a "synthetic scheelite" plant. Pictured here are three 54-inch by 30-foot digestors operating at the United States Vanadium Company's Scheelite, California plant.



to ores containing molybdenum as powellite [Ca—(WoMo)0_4], as molybdenum is separated from the tungsten and recovered as a valuable byproduct.

Hydrochloric acid leaching, using dilute acid to upgrade concentrates and remove phosphorous by dissolving lime and phosphate minerals, leaving a salable residue.

The pressure reactor process

The development of the pressure reactor process began in 1939 as the direct result of the application of flotation to improve the recovery of tungsten from western scheelite ores, and as a part of the flotation mill circuit at the Pine Creek plant of the United States Vanadium Company.

In the effort to cure low recoveries resulting from tabling of tungsten ores a remedy was found in soap flotation of the slime portion of the ore applied in conjunction with tabling of the sand. Recoveries by flotation ranging from 85 to 95 percent resulted in concentrates containing from 5 to 20 percent WO_3 The higher recovery being in the lower grade concentrates, depending on the character of the ore. In order to utilize maximum recovery by soap flotation, a method of intermediate treatment which was economically effective on material as low grade as five percent WO_3 was the objective.

The answer developed from the Russian Autoclave process of Moslenitzki, who had discovered the reaction several years earlier, but failed in his attempt to apply it in stationary pressure vessels equipped with stirring devices, due to mechanical difficulties with sticky pulp.

Table IV

Units of Tungsten Treated, Recovery, and Grade of Plant Feed and Refinery Product at Salt Lake City Tungsten Chemical Refinery

Item	*Figures*
Units of WO_3 treated	388,420
Units of WO_3 recovered	362,599
Recovery	93.35 percent
Minimum WO_3 in plant feed	6.00 percent
Maximum WO_3 in plant feed	19.00 percent
WO_3 content of refinery product	65.00 percent

This process uses dilute soda ash solution and finely ground tungsten concentrates under elevated pressure in which the tungsten is converted into a soluble sodium tungstate in accordance with the reaction.

$$CaWO_4 + NaCO_3 + H_2O + \text{Heat} = CaCO_3 + Na_2WO_4$$

However, the mechanism of the reaction is probably first the decomposition of the sodium carbonate to caustic soda, $3Na_2CO_3 + H_2O + \text{Heat} = NaOH + Na_2CO_3 + 2CO_2$, in which the amount of NaOH formed is a function of the heat and pressure. In a closed vessel in which this reaction is carried out, the carbon dioxide recombines in the special designed cooling apparatus to form sodium carbonate and sodium bicarbonate. Thus silica is reprecipitated. The caustic soda is reconverted to sodium carbonate in the cooling stage of the pressure reactor.

Molybdenum is also dissolved according to the reaction, $CaMoO_4 + Na_2CO_3 = Na_2MoO_4 + CaCO_3$. Copper, lead, tin, arsenic and phosphorous remain in the residue as the reaction is reversable and if the concentration of tungsten exceeds 7.5 grams per liter the reaction tends to slow down and recovery decreases. Due to this solubility limit and the fact that plant reactor capacity limits are the reacting volume of the rotary vessel, the system operates most efficiently on low-grade material assaying between 5 and 20 percent WO_3. If highgrade concentrates are charged a lesser quantity must necessarily be fed to the circuit, or the concentrates given repeated retreatments to obtain low tailing. Therefore the efficiency of this system developed with the characteristics of the flotation step in western mills, enabling the flotation step to operate at high recovery if the chemical process can be applied without intervening shipment—that is if the chemical treatment is integral with the concentrator. In general the saving of 10 percent recovery by flotation was found to pay all or the largest part of the cost of the reactor refining.

This efficiency of the system as developed can be illustrated by the operating results shown in table numbers I and II. Costs are World War II costs of labor and materials.

Mo purification and recovery

The recovery of tungsten from reactor solutions after filtration involve the neutralization of the excess Na_2CO_3 with acid and the precipitation and recovery of molybdenum in accordance with the reaction:

$$Na_2MoO_4 + 4Na_2S + H_2O = Na_2MoS_4 + 8NaOH$$

$$Na_2MoS_4 + 2HCl = 2NaCl + MoS_3 + H_2S$$

$$MoS_3 + 9\,O = MoO_3 + 3SO_2$$

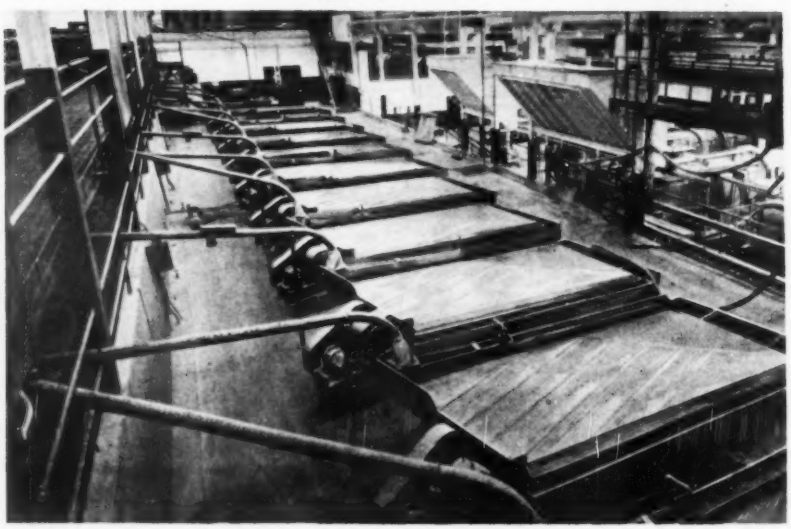
Molybdenum thus recovered becomes a byproduct of considerable value, and if present in sufficient quantity pays a substantial portion of reagent costs. It is usually pure enough to find a market in low copper-molybdenum alloys.

After molybdenum is removed the solutions are treated with lime, whereupon synthetic scheelite is precipitated according to the reaction:

$$Na_2WO_4 + CaO + H_2O = CaWO_4 + 2NaOH.$$

The product of the reactor usually is better than specifications, and brings a premium.

View of a portion of a fully integrated tungsten concentrator and chemical refining plant. Digestors in upper right hand corner. Capacity of the plant is 14,000 units of "synthetic scheelite" monthly.



Acid Leaching

The third type of intermediate refining developed involves hydrochloric acid leaching to remove selectively lime ($CaCO_3$), and phosphorous and depends upon careful control of the strength and temperature of the acid to dissolve lime and phosphorous and at the same time avoid the solution of tungsten. Some tungsten is unavoidably lost in the reaction. It was applied to favorable ores which can yield a relatively high-grade concentrate with a reasonable recovery, and preferably to ores in which the molybdenum content is low, as molybdenum cannot be removed by this method. In this type of refining the lime is first removed by cool acid and filtered or decanted. The phosphate minerals are then leached carefully with a fresh acid addition, using a short time of contact and cool solutions.

An outstanding example of successful acid leaching is the Nevada-Massachusetts. Company's plant at Tungsten, Nevada, where a finished product for the market is being produced at this time by a combination of flotation, tabling, and acid leaching.

Of the three methods of intermediate refining which have evolved in the past 10 years, the pressure reactor system has had the widest application in western mills largely through the availability of the process to the industry at Salt Lake City. The effect of this development on United States tungsten production during World War II from five plants thus equipped is shown in Table III, where the third column gives the amount of tungsten produced from low-grade mill products. As the use of intermediate chemical refining enabled the increased recovery of tungsten from western plants the total American production increased accordingly. American reserves of tungsten also increased as a result of revaluation of former marginal ore bodies, the inverse result of higher recoveries.

As has been noted, the reactor process, as well as the hydrochloric acid leaching process, was developed as an auxiliary part of a tungsten mill circuit using flotation and is best operated as a part of such a plant. The initial units were both involved and costly. It is probable however that the reactor process would have eventually evolved into a simplified form which would have found a place at reasonable cost in tungsten mills of moderate size, as a part of mill circuits.

Sacking and weighing "synthetic scheelite" at the Salt Lake City plant during World War II. The Edwards roaster in the background was used to dry the concentrate.

In 1942 the War Production Board arranged for a three reactor plant to be built at a cost of $421,000 and operated at Salt Lake City, Utah, to serve the increasing number of new tungsten producers, who were not prepared or equipped to refine their own output. The essential data of this project are shown in table numbers IV and V.

At the close of the war this plant was closed down and sold by War Assets Corporation, and the position it filled with the developing tungsten industry in the western United States was lost. The service the Salt Lake City plant gave to the western tungsten mills, operating on a non-profit basis by and for the western industry, was a good example of the intelligent raw materials procurement planning by the war-time Metals Reserve Company. In this case tungsten procurement goals were met, the industry developed and prospered and with it the investment of the Government was recaptured at a profit.

Table V

Costs in Dollars Per Unit of Finished Product at Salt Lake City Tungsten Chemical Refinery

Item	*Dollar Cost*
Labor	$ 0.486
Chemicals	2.202
Supervision and expense	2.183
Total cost per unit WO_3	$ 4.871
Amortization of plant	$ 1.250
Total cost	$ 6.121
Approximate price paid for concentrates	$21.00 per unit
Finished cost of concentrates	29.07 per unit

Refining Plant Overlooked

The recent establishment of the price of tungsten to $63.00 per unit in 1951, in order to restore the United States tungsten industry, apparently initially failed to take account of the need of intermediate refining facilities such as was provided at the Salt Lake City plant.

Table VI

Average Analysis of "Synthetic Scheelite" Produced by a Single Rotary Reactor Plant

Constituent	*Percent*
Tungsten trioxide (WO_3)	66.0
Molybdenum	0.04
Phosphorus	0.02
Copper, lead, arsenic, tin	Trace

Government Bureaus planning the present domestic tungsten program apparently assumed at the start that the few tungsten refineries in industry hands could supply the same service as the non-profit Salt Lake City plant. This obviously is impossible because such plants are operated as a part of an existing mine or mill setup and could not be expected to divert the use of their facilities to service other mills or mines on a non-profit basis. When a profit is charged, together with freight costs from distant plants, the benefit of the intermediate refinery is lost and recoveries at the mills are sacrificed.

As a result of recent studies by the DMPA of the tungsten situation, it is understood that some Government action supporting a refinery for low-grade mill products in the western region will be considered. It is hoped that the pricing and ad-

(*Continued on page* 88)

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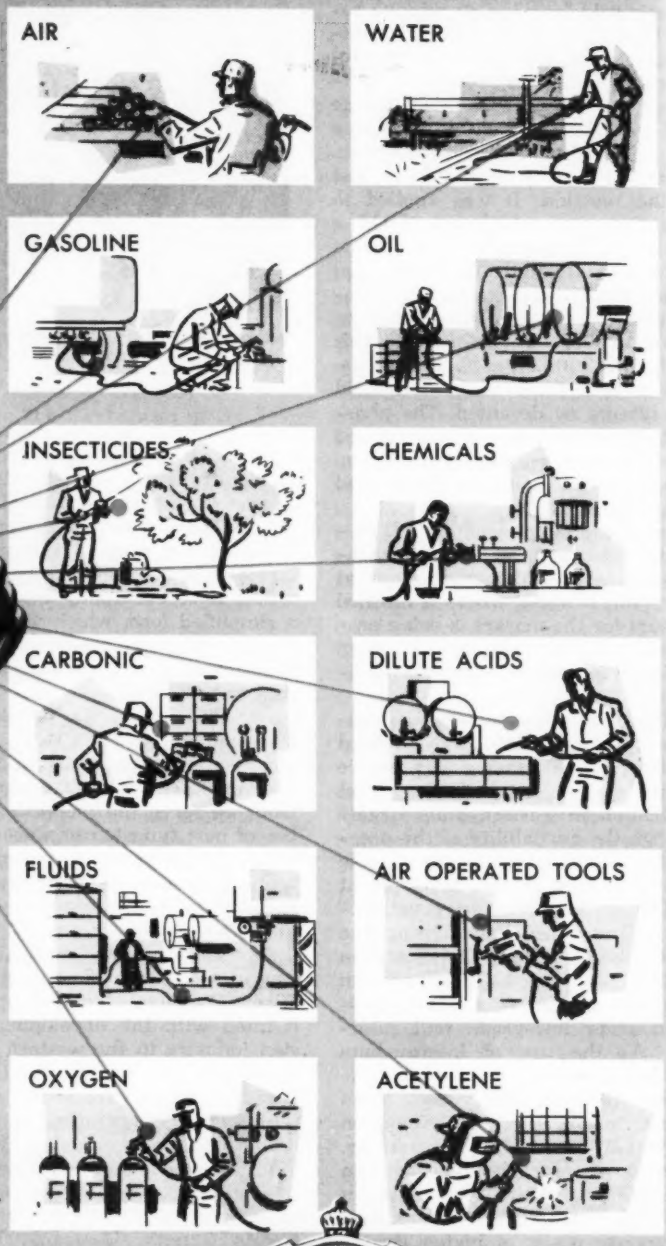

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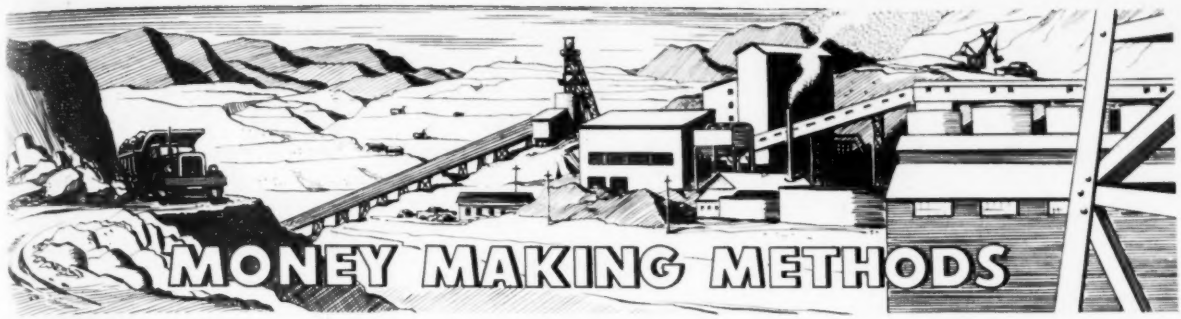


SPRING TONIC FOR TRACTORS PEPS UP DAILY PERFORMANCE

The best spring tonic for crawler tractors is a little preventive maintenance to insure high output during the torrid summer months ahead. Fred O. Schreck, Supervisor of Service, Industrial Power, International Harvester Company has outlined a few steps which if undertaken now will save repair dollars and down time later on.

Engine lubrication is the logical place to start. Old oil, which is dirty and diluted by cold-weather starting, should be changed to recommended summer grade. It is important to drain old oil from a hot engine.

Another major step that should be done without fail is draining and flushing the cooling system. It is a good idea, after draining the antifreeze, to fill the system with a solution of from five to 10 pounds of ordinary washing soda and water, depending on the size of the engine. Leave off the radiator fill cap and operate the engine until the water is hot. Then drain and flush with clean water. Refill with soft or rainwater, if possible, and the recommended amount of rust inhibitor.

Next check the water hose clamps for leakage and tighten where necessary. Another excellent check for leakage is to remove the fan belt so that the water pump will be inoperative. Next fill the radiator to the top, leave off the radiator cap, and, while the engine is running, hit the throttle hard and watch for air bubbles. If bubbles appear, it's a good indication of leakage around the cylinder head gaskets.

While conditioning the cooling system, check and adjust fan belt tension. Inspect the fan for bent and loose blades and check the fan hub mounting capscrews for tightness. Clean the spaces between the radiator fins by blowing them out with an air hose or flushing them with a water hose. Many a cracked block has resulted from overheating due to clogged radiator fins. This simple precaution will eliminate any chance of this happening.

While you're about this spring tonic job, clean and refill the air cleaner tray. In refilling use about one-half oil and one-half kerosene. This allows a better flow of air to the manifold without reducing the cleaning efficiency of the unit. Air cleaner connections should be tightened and the pipe from cleaner to manifold should be examined for holes or cracks. Abrasives entering the engine from improperly filtered air can cause serious damage to rings and sleeves.

For tractors with gasoline starting systems, it's good procedure to check the gasoline strainer, then clean and wash the bowl at the same time. Distributor and magneto points should be checked for wear and correct gap setting. Look at the Diesel fuel water trap, too. It may be time to take it apart and clean it. "Spring tonic treatment" for tractors should include replacing oil filter elements. In most crawlers, these elements should be replaced with each oil change.

Another good tip for spring and the year around is to service your battery. Clean terminals with hot water and baking soda and steel wool when necessary. Then coat them with vaseline. Be sure that the cells are filled with distilled water to $\frac{3}{8}$ of an inch above the separators. If the battery water level is constantly low, it may be a sign that it is being overcharged. The charging rate should be investigated and adjusted at once, where necessary, to prevent serious damage to the battery.

To insure fast starting, lubricate the magneto impulse coupling with kerosene or light machine oil.

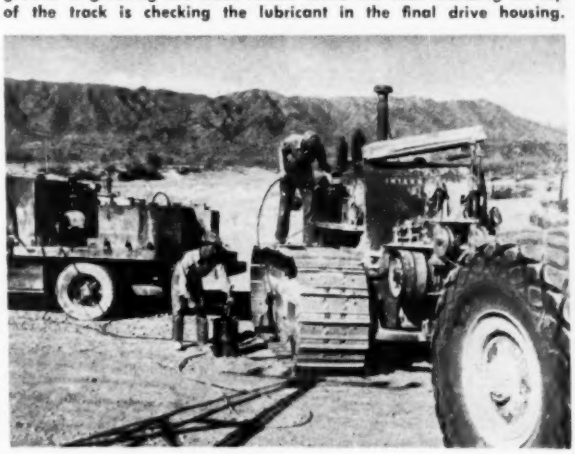
If transmission and final drive lubricants have not been changed for a season, now is the time to do it. If the oil in the transmission and final drive has been thinned during the winter for easier operation, the lubricant certainly should be changed to a heavier grade before hot weather. Work the tractor until the lubricant is warm and drain. Then refill with the proper grade of oil in accordance with the manufacturer's recommendation.

Another item you can check by a quick inspection at this time is the track assembly. If the track is too tight or loose, excessive wear will result. Adjust tracks to the type of soil in which the tractor is operating.

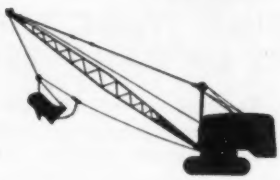
These preventive maintenance suggestions are not expensive nor time consuming, and can be followed in the field. They often are postponed or overlooked with the result that real trouble develops later on, slowing down contracts and wasting man hours.

A "spring tonic treatment" for tractors is like putting money in the bank. It pays off with interest later on in keeping your crawlers producing longer with fewer delays for repairs.

Make money by correct lubrication at all times. The man on the ground is greasing the track rollers while the man standing on top of the track is checking the lubricant in the final drive housing.



VERSATILITY



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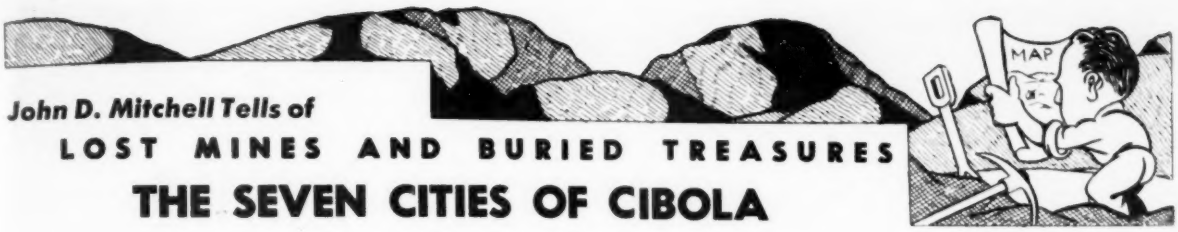

John D. Mitchell Tells of

LOST MINES AND BURIED TREASURES

THE SEVEN CITIES OF CIBOLA

For almost 50 years the Spanish Conquistadors and their Indian allies had been fighting continuously for the possession of the west coast of Mexico. By that time they had reached the Mesa del Toro (Mesa of the Buffalo Bull) which the great chief of the Tarahumara Indians still controlled. The Indians, who had lost a large number of warriors in battle and by plague, had been forced to abandon their cities and villages and to concentrate their forces on top of the high plateau. It was here that they made what proved to be their last stand against the cruel invaders.

At Mesa del Toro, two great armies faced each other; one on the mountain top, the other in the valley below. The chief of the Tarahumaras, wearing his war bonnet of eagle feathers, stood at the edge of the high precipice. He shaded his eyes with his hand and looked into the valley, 3,000 feet below, where burned the bright camp fires of the invaders.

There was little sleep that night, since both armies were actively preparing for the great battle that all knew was to come. Darkness settled down over the high Sierras and crept into the valley like a wolf on the fold. The glow from the thousands of camp fires showed blood red in the sky above, and the thump, thump of the war drums was carried down from the mountain top on the still night air. Just as the morning sun began to tint the east, the fog banks lifted. Thousands of warriors, formed into two great armies, faced each other, both bent on destruction.

Then came the order to advance—and the battle was on. The invaders rushed up the steep slopes only to be met by shower after shower of arrows, and avalanches of stone rolled from the edge of the mesa above. It was cut and slash everywhere until the mountain side was strewn with dead and dying. All that day and far into the night the great battle raged and the gullies ran red with blood.

On the second day, when the sun rose over the mountain peaks, the Chief of the Tarahumaras mounted his great white steed and again went to the edge of the precipice to look into the valley. Thousands watched while horse and rider stood there, vividly outlined against the deep blue sky. Suddenly, the magnificent horse rose on his hind legs and pawed the air. From somewhere on the mountainside, an arrow had winged its way straight to the heart of the chief. His dead body pitched forward and fell to the rocks far below.

A great wail of despair went up from the mountain top when the Tarahumaras realized what had happened. The Spaniards, taking full advantage of the tragedy, rushed forward and over the edge of the mesa. No quarter was shown when the two great armies met on the plain. One of the first to fall was a Spanish captain—shot through the side with an arrow and then clubbed to death. Such battles cannot last indefinitely, but this one did not come to an end until full 50,000 lay dead or dying.

After losing their leader, the Indians fell back to Tobarra. The Spaniards were lead by Moya y Contreras, under direct command of Pedro Sanchez. The Indian leader was Chief Troano whose code of law exists among the tribe even to this day.

To Captain Antonio Gomez went the task of cleaning up the battlefield after the Tarahumaras had retreated. Among the bodies he found that of an ancient negro. From a captive Indian squaw he learned that it was the body of her husband, Estevanico (Black Stevan, the Moor) who, with Alvar Nunez Cabeza de Vaca, had been shipwrecked off the coast of Florida in 1528 and, after eight years of wandering among the Indian tribes, was picked up by a party of Spaniards scouting along the West Coast of Mexico.

When taken before Viceroy Don Antonio de Mendoza in the City of Mexico, Estevanico had told of having seen much and heard more. Among the tales he related was the one of the Seven Golden Cities of Cibola, where the inhabitants manufactured household and cooking utensils of solid gold and silver, and decorated their palaces with gold, silver, and precious stones.

Acting upon the negro's report, Viceroy Mendoza sent Frey Marcos

Continued on Page 43

Every year, placer miners working in the arroyo, find trinkets of odd and quaint design, all fashioned from solid gold and silver.

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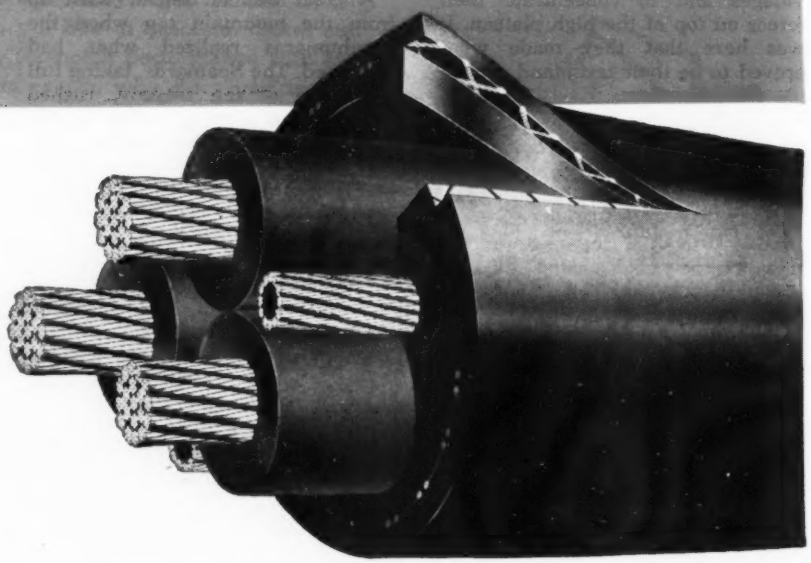

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Seven Cities of Cibola

Continued from page 41

de Niza to search out the Seven Golden Cities for the Crown of Spain. With Frey Marcos went Estevanico—Black Stevan, the Moor. When they reached Culiacan, the priest fell ill and decided to rest.

After four days of foot-travel from Culiacan, the Black Moor sent a message, a very large cross, indicating that he had reached the Seven Golden Cities. Estevanico never returned and Frey Marcos, believing him to be dead, continued on alone. Mislead by his Indian guides, the Spanish Friar was taken hundreds of miles to the north, to the poor litttle Zuni villages, one of which he was shown from the top of a high hill, some distance away. Frey Marcos returned to Mexico and reported to Viceroy Mendoza that he had seen one of the Golden Cities, and that the others were, no doubt, fully as rich as the early accounts.

Viceroy Mendoza lost no time in acting on the good friar's report. He immediately commissioned Francisco Vazquez de Coronado to capture and sack the Seven Cities of Cibola. With clanking armor, waving plumes and shining banners, Coronado's expedition followed practically the same route Frey Marcos had taken previously. When they reached the little Zuni villages, they were disgusted and disappointed to find no gold or silver, and terrible were the curses hurled at Frey Marcos. Coronado's party then journeyed on, far out onto the plains of Kansas and Nebraska, before it returned to the City of Mexico.

The truth was that Estevanico, the one man who had looked upon the real Seven Golden Cities of Cibola, had been taken prisoner when he first entered one of the villages, but (according to the record he, himself, had left) was not killed as had been generally supposed. During the years he was held in captivity, the negro had no means of communicating with Frey Marcos de Niza, but had kept, on pottery fragments, an account of his wanderings. After the battle on the mountain top, this record fell into the hands of Captain Antonio Gomez and is now in the possession of his descendants who still live in that vicinity.

According to this document, the Seven Cities of Cibola were located in a narrow valley, six leagues long. It was the custom of the Indians to name their villages or cities after some natural object in the vicinity. Therefore, they called the seven villages, which in reality were seven large community houses, the Seven Cities of Cibola, naming them for the natural rock formation which resembled a large buffalo bull. The Indian name for a buffalo bull was "Cibola." To the Spaniards it was "Mesa del Toro."

Before abandoning their villages and fortifying the Mesa del Toro, the Indians had dismantled their palaces and buried their gold, silver and precious gems, said to have amounted to more than 50 tons. Troano, the Chief of the Tarahumaras, had given the following order: "On the 22nd of June, I will stand with my back to the Cibola (the rock bull on top of the mesa), and where the shadow strikes on the opposite bank of the arroyo in the morning, all valuables must be buried in a cave." This, according to the record, was done.

In 1911, a little more than 300 years after the great battle of the mountain top was fought, the writer visited the Mesa del Toro. While traveling up the arroyo, the old guide stopped and pointed out the spot where the great treasure is supposed to lie buried. Some years ago a small portion of the treasure was washed out of its hiding place by a great flood that rushed down from the mountains.

Every year, placer miners working in the arroyo find trinkets of odd and quaint design, all fashioned from solid gold and silver. Most of these trinkets are washed out by an old Indian, known as Mochomero, who wanders around that part of the country. Many of the natives believe that the job of guarding the treasure has been handed down to him, but no information can be won from him, even by his fellow tribesmen who have become more civilized.

A light rain began to fall as we climbed upward, and the clouds hung low over the mountains. About mid-afternoon we reached the top of the high mesa, far above the clouds, and the mountain peaks stood out like beautiful islands in a silvery sea. Over the top of the Mesa del Toro were scattered many hundreds of arrowheads and tomahawks. Crude piles of rock marked the spot where many an Indian warrior and the feathered Chief heard the call of Manitou.

As the old guide and I stood on the western edge of the high plateau, with our backs to the natural rock formation which so much resembles a buffalo bull, the clouds parted. There nestling in the warm sunshine, in a green valley six leagues long, lay the ruins of the Seven Golden Cities of Cibola.

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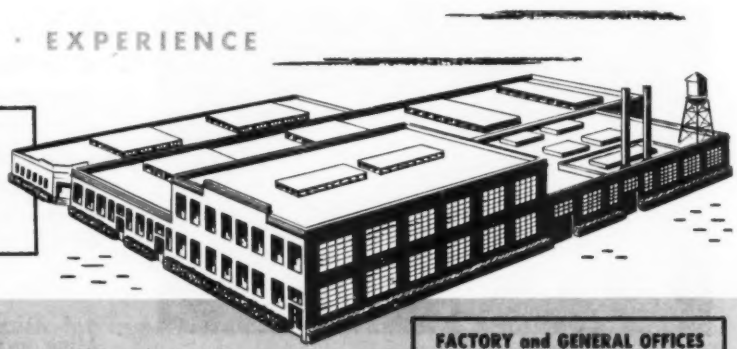

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AR-8

THE AMERICAN RUBBER MANUFACTURING COMPANY

ACTIVITIES OF U. S. MINING MEN

W. E. HALDANE of Grand Junction, Colorado, has been elected president of the Uranium Ore Producers Association. Louis Gaggini, also of Grand Junction, and Howard Balsley of Moab, Utah, have been elected vice presidents. Directors are State Senator D. L. Williams, Norwood, Colorado; T. H. Skidmore, Grand Junction; Chester Wright, Greenriver, Utah; Abe Day, Moab; J. W. Gramlich, Paradox, Colorado; and Vance Thornburg, Grand Junction.

Robert H. Nelson, mining and geological engineer, has resigned from the mining branch of the Reconstruction Finance Corporation and has opened consulting engineering offices in Helena, Montana. He was employed by the RFC during World War II and is widely known to mine operators in all parts of the United States because of his work in establishing and supervising the RFC "Preliminary" or mine accessibility loan program during the last war.

Robert Henderson has rejoined the staff of the Climax Molbydenum Company after a three-year absence. He will be assistant general superintendent, succeeding **Franklin Coolbaugh** who advanced to general superintendent. Mr. Henderson had been with Climax for 12 years before leaving three years ago. At that time he was mine superintendent.

Dr. William Hume II has been appointed director of the college division at the New Mexico Institute of Mining and Technology. He is an expert on weather research and rainmaking, and formerly taught at the New Mexico University in Albuquerque.

R. D. Bradford, manager of the western department of the American Smelting and Refining Company, has been transferred to the New York offices. He will later go to Northern Queensland, Australia, to inspect company properties at Mt. Isa where the firm operates a lead, zinc, copper mine, operates a lead smelter, and is building a copper smelter. **E. M. Tittmann,** manager of the southwestern department, will succeed Mr. Bradford, and B. D. Roberts will take over Mr. Tittmann's former job.

Alwin F. Franz has been elected president of the Colorado Fuel and Iron Corporation. **Carl W. Meyers** who had been president since 1946 was elected vice chairman.

R. N. Roby has resigned from the U.S. Bureau of Mines and is now employed by the American Alloy Metals Company in charge of tungsten operations at the Browns Lake property in Beaverhead county, Montana.

Dr. LeRoy Scharon, associate professor of geology at Washington University in St. Louis, Missouri, was elected chairman of the Mining, Geology, and Geophysics Division of the AIME at the Institute's annual meeting in New York, February 18-21. He now becomes a director **ex officio** of the Institute during his year of service.

G. A. Aspell of the U.S. Bureau of Mines is now located at the Bureau's office at Mt. Weather, Bluemont, Virginia. He had formerly been with the Bureau on the Mesabi Range in Minnesota.

George C. Floyd, vice president of Vanadium Corporation of America, has been elected a director of the company. **Patrick J. Gibbons** has retired as executive vice president and director. Mr. Gibbons had been with Vanadium for 32 years. He will be retained in an advisory capacity as consultant to the president.

LOUIS BUCHMAN, general manager of the western properties of Kennecott Copper Corporation, has been named vice president and a director of the corporation. Mr. Buchman began his career with the old Utah Copper Company in 1914. After a succession of positions with the firm, he was named general superintendent of mines in 1938, and general superintendent of operations in 1946. He was appointed general manager of the Utah Copper Division of Kennecott early in 1949, and, later that year, general superintendent of western operations which includes Kennecott divisions in Nevada, Arizona, and New Mexico, in addition to the Bingham mine and the Magna and Arthur mills.

Erwin Vogelsang, director of NPA's Tin, Lead, and Zinc Division, presided at a recent meeting of the Cadmium Producers and Cadmium Distributors and Consumers Industry Advisory Committee in Washington, D. C. Among those attending, were **Howard L. Young,** American Zinc Company of Illinois, St. Louis; **Kurt Weinberg,** National Zinc Company, Inc., New York City; **L. G. Matthews,** American Smelting and Refining Company, New York City; **G. Howard Lefevre,** United States Smelting, Refining, and Mining Company, New York City; **E. H. Klein,** The New Jersey Zinc Sales Company, New York City; **Charles R. Ince,** St. Joseph Lead Company, New York City and **Clarence Glass,** Anaconda Sales Company, New York City.

Harris B. Salisbury is now manager of the Silver Reef Mining Company at Leeds, Utah. He had formerly been mine manager of the Sheldon mine in Yavapai county, Arizona.

P. A. Lewis has been promoted from resident engineer for American Smelting and Refining Company at Northport, Washington, to superintendent

FREDERICK W. DENTON, JR., has been appointed superintendent of Gogebic Range operations for the Oliver Iron Mining Division of the United States Steel Company. He succeeds Harry W. Byrne who retires after 43 years with the company. Mr. Denton was general superintendent of Idaho Maryland Mines Corporation at Grass Valley, California, from 1935 to 1944, and then became general manager of the Copper Range Company at Painesdale, Michigan. In 1948, he joined Oliver as a production engineer at the Ironwood, Michigan, operations, and was promoted to assistant superintendent at Ironwood in February 1949. He held this position at the time of his new appointment.

in charge of its Van Stone operations in the Northport mining district.

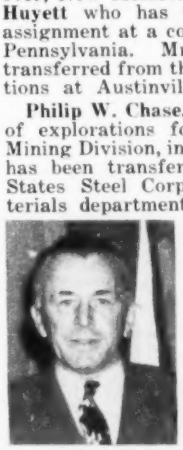
Charles Clement French has been appointed president of the State College of Washington.

John Olson has joined the geological department of the Inland Steel Company and will be stationed at Iron River, Michigan, where he will devote his time to Inland's Menominee Range properties.

George L. Ratcliffe has been elected a vice president of National Lead Company. He has been a member of the board of directors since 1948.

W. T. Pettijohn is the new superintendent of the Empire Zinc Division of New Jersey Zinc Company at Hanover, New Mexico. He succeeds **S. S. Huyett** who has taken over a new assignment at a company property in Pennsylvania. Mr. Pettijohn was transferred from the company's operations at Austinville, Virginia.

Philip W. Chase, formerly manager of explorations for the Oliver Iron Mining Division, in Duluth, Minnesota, has been transferred to the United States Steel Corporation's raw materials department in Pittsburgh.



C. J. ABRAMS (left) has been promoted to general manager of Climax Molybdenum Company at Climax, Colorado. He has been general superintendent of operations at Climax since 1939. Mr. Abrams joined the firm in 1928, but was associated with the Colorado Iron Works Company from 1936 to 1939. FRANKLIN COOLBAUGH (right) has been promoted from assistant general superintendent of Climax operations to resident manager of operations. He joined the company in 1932.

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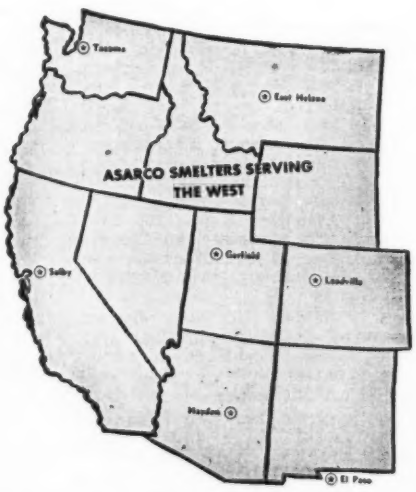


AMERICAN SMELTING AND REFINING COMPANY

ACTIVITIES OF INTERNATIONAL MINING MEN

S. J. Carroll, formerly manager of Minerales de Nacozari in Nacozari, Mexico is now general superintendent of Manganese, Inc. at Henderson, Nevada.

R. H. Kingston has been appointed mine manager for Whippet Consolidated Gold Mines, N. L. at Tennant Creek in the Northern Territory of Australia.

Newland Baldwin has been elected president of Paracale Gumaus Consolidated Mining Company in the Philippines. **Frank Bacon** has been elected to the board of directors. **George Goodier** is in charge of operations at the mines.

Erik Lundkvit of Fredriksvaerk, Denmark, has been appointed technical manager of the Norrbotten Iron Works in northern Sweden.

Jorge A. Broggi has been appointed director general of the Instituto Nacional de Investigacion y Fomento Minero in Peru. He replaces **Alfonso Rizo Patron Remy** who resigned. Mr. Broggi is prominent in scientific and educational circles in Peru. He was one of the founders of the Geological Society of Peru in 1924.

Dr. Harry V. Warren of the department of mining at the University of British Columbia was recently elected president of the British Columbia and Yukon Chamber of Mines, succeeding **M. M. O'Brien,** managing director of Bralorne Mine. **S. J. Crocker** and **Henry L. Hill** are vice presidents, and **Frank Woodside** continues as secretary-manager.

R. C. Buckett has been appointed assistant general manager of Lake View and Star Ltd. at Kalgoorlie in Western Australia.

A. Arnsuld is now a government geologist in the Service des Mines at Noumea, New Caledonia.

Erik Bengtson has resigned as managing director of the Boliden Company at Skelleftehamn, Sweden.

Kenneth Bickford of Crosby, Minnesota, has been appointed chief engineer for the Minnesota-Huron Company, Ltd., a subsidiary of W. S. Moore Company. He will be in charge of the company's exploration program in Ontario, Canada. He succeeds **C. H. Scheuer** who has retired.

Minoo P. Neterwala of the College of Mining & Metallurgy at the Benares Hindu University in Benares, India, is spending the year in Europe visiting various mines and mining schools.

R. C. James is now general manager of Tungsten Consolidated Ltd. in Australia. He had been with St. Joseph Lead Company in Missouri.

Hans Grebius, mining engineer, has been appointed managing director of the Fagersta Mining Company in northern Sweden. His new position is effective July 1.

P. S. Barratt has been appointed superintendent of the engineering department, Kimberly operations, of Consolidated Mining & Smelting Company in British Columbia, Canada. He was formerly superintendent of maintenance at the company's Sullivan mine in the Kootenay district of British Columbia.

Franz Weisblatt, former editor of the **Philippine Mining News,** is making an extended business trip through the Orient.

Angusto N. Wiese is the first Peruvian to be elected to the board of directors of the Cerro de Pasco Corporation. Mr. Wiese is a prominent industrialist and banker. He is president and chief executive officer of A & F Wiese S.A. and of Banco Wiese Ltdo. He was formerly president of the Lima Chamber of Commerce and holds directorships in several Peruvian corporations.

HENRY H. FOWLER has been appointed administrator of the National Production Authority. He succeeds Manly Fleischmann who resigned to devote his full attention to his post as administrator of the Defense Production Administration. Mr. Fowler had been serving as deputy administrator of NPA since September 1951. He was formerly associated with the law firm of Fowler, Leva, Hawes and Symington. During World War II, he was assistant general counsel for the Office of Production Management, and later for the War Production Board. He has a long record of government service, in addition to private practice.

James B. Hustad of the West Indies Mining Corporation has returned to Puerto Rico after a trip to Duluth, Minnesota.

Wing G. Agnew, chief of the mining research branch of the U.S. Bureau of Mines, has gone to Johannesburg, South Africa.

Barney Foust is mill superintendent of the San Mauricio Mining Company in the Philippine Islands. He had been mill superintendent for Atok-Big Wedge Mining Company in Baguio.

Dr. D. F. Kidd of Vancouver, British Columbia, has been elected president of the Canadian Institute of Mining and Metallurgy at its annual meeting in Ottawa. He succeeds **Dr. Oliver B. Hopkins,** director of the petroleum of the Canadian Defense Department and vice president of Imperial Oil, Ltd.

H. A. Kursell has recently arrived in Lima, Peru. He was formerly a resident engineer of the American Smelting and Refining Company in New York and is now a private consultant.

R. Kanjana-Vanit is now employed by Tongkah Harbour Tin Dredging Ltd. at Bhuket, Siam.

Dr. Robert F. Mehl, director of the Carnegie Institute of Technology's Metals Research Laboratory and head of the Metallurgical Engineering Department, spent January in Brazil heading a commission of the Technical Cooperative Administration under the auspices of the Department of State. Dr. Mehl, a leading authority on metalurgy, will investigate the possibilities of the development of the iron and steel industry and the profession of metallurgy.

Thomas Fraser, supervising engineer, Coal Preparation Section, United States Bureau of Mines, has been assisting the Colombian government in part time work for the past three years. He has been working chiefly with the Institudo de Fomento Industrial and the National Railway Administration.

Alan Hunt is the new mill superintendent of the Athletic Mill at Klondyke. He recently returned from Bolivia where he worked for the Patino Tin Mines.

John O. Cartledge has been appointed branch manager of Austral Bronze Company, Pty. Ltd. at Derwent Park in Hobart, Tasmania. Previously, he had been on the staff of the Broken Hill Associated Smelters Pty. Ltd. at Port Pirie, South Australia.

Eric Lindfors, mining engineer, is now with Bolidens Gruv AB at Renstromsgruvan, Sweden. He had formerly been with Aktiebolaget Yxsjo Gruvor in Ludvika, Sweden.

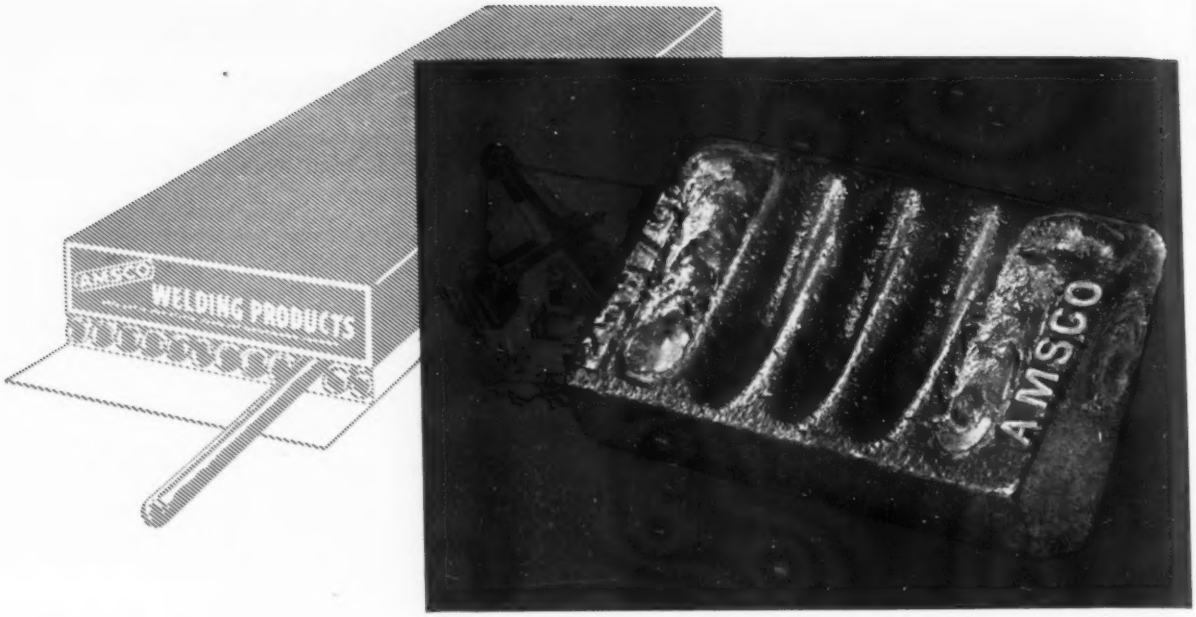
H. N. Hepker has been appointed director of research for the Rhodesian Anglo-American, Ltd.

S. B. Dickinson, director, Department of Mines, Adelaide, Australia; **H. O. Olson,** general superintendent, Marmoraton Mining Company, Ltd., Marmora, Canada; **E. Weberg,** inspector of mines, and **M. Dupont,** consulting engineer, Union Miniere Du Haut-Katanga, Brussels, Belgium were among recent visitors at the South Agnew and Morton mines near Hibbing, Michigan.

Robert Ridgway of Washington, D. C. and **Donald C. Warner** of Pacific Palisades, California were recently appointed as United States representatives to commodity committees of the International Materials Conference. Mr. Ridgway, chief of the Ferrous Metals and Alloys Branch, Bureau of Mines, will serve on the Tungsten-Molybdenum Committee.

M. M. Aycardo, Jr. is now a junior executive and assistant consulting engineer with A. Soriano y Cia, Manila, Philippine Island. Mr. Aycardo was formerly with International Engineering Corporation. A. Soriano y Cia operate and manage the various Soriano managed mines including the International Engineering Corporation.

P. F. Ransby, formerly with the Luipaardsvier Estate & G. M. Company, Ltd. in Transvaal, South Africa, is now active mine manager at the Wanderer Consolidated G. M. Ltd. in Southern Rhodesia.



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INTERNATIONAL NEWS

French Guiana Bauxite Subject of Further Study

Reports reaching *Mining World* indicate that some prospecting for bauxite has been undertaken recently in French Guiana by the Guiana Bureau of Open Mines. The region prospected is located to the southeast of Cayenne, a short distance from the seacoast.

First prospecting results have been encouraging but it will be several months before information will be available as to whether the deposit merits development. It is believed that all information should first be assembled concerning the probable extent of the deposit as determined by drilling, and careful analysis of the ore specimens gathered. If the tonnage is sufficient, it is expected that some important public works will have to be undertaken before the deposits can be brought into economic production.

Utah Signs Agreement To Develop Peruvian Ore

The Utah Construction Company of San Francisco has signed an agreement with the Peruvian Santa Corporation to develop the Marcona iron deposits located in the Department of Ica, close to the Pacific coast, and about 500 miles south of Lima, Peru.

Sufficient test pitting and drilling has been done to prove about 15,000,000 tons of 60 percent iron ore. This is mainly hard lumpy magnetite and hematite, low in phosphorous. It is said to run less than 0.5 percent in sulphur, in an oxidized surface layer about 20 meters thick with little overburden. Below this layer, there is appreciable pyrite in the ore, which raises the sulphur content to 3.5 percent or more.

Utah's contract provides that, if a six-month investigation yields satisfactory results, the firm will equip an open-pit mine and a port, at a cost of about $5,000,000. It will produce at least 500,000 tons per year, of which Santa Corporation will be able to buy up to 300,000 tons, at a quarter of the Lake Superior prices (basis for U.S.A. iron ore sales), for its proposed electric pig iron and steel furnaces and rolling mill at Chimbote. The remainder may be exported but Santa will collect a 6 to 7 percent royalty. After 20 years, the property and fixed installations will revert to the Santa Corporation.

COMINCO To Mine 3,000 Tons Daily At Kimberley

Surface stripping, a new operation at the Sullivan mine of Consolidated Mining & Smelting Company at Kimberley, British Columbia, has exposed 2,000,000 tons of ore which will be mined from the surface at the rate of 3,000 tons a day.

To prepare for the new development at the lead-zinc-silver mine, 200,000 cubic yards of gravel were removed and hundreds of tons of surface rock, barren of ore, were blasted away. Holes were drilled from four to eight feet apart and between 800 and 1,000 holes were blasted with each detonation, each blast breaking up about 25,000 cubic yards of rock.

While surface work was progressing, miners underground were driving a raise from the 3,900 level to the floor of the pit. With production under way, trucks will haul the ore from the stripping operation to the raise where it will fall to the 3,900 level. There the ore will be loaded into mine cars and hauled to the underground crushing chamber on the 3,800 level before going to the mill.

White Pine and DMPA Sign Purchase Agreement

A long-term purchase contract has been signed by White Pine Copper Company, and the Defense Materials Procurement Agency.

DMPA has agreed to pay 25½ cents a pound for copper produced at the company's mine in Ontonagan county, Michigan. This is one cent above the present copper price ceiling of 24½ cents. The agency has also promised to buy up to 243,750 tons of the first 275,000 tons produced at the mine, and has retained the right to buy the entire output of the company for the length of the contract period. The contract will expire Dec. 31, 1961 or when the company has recovered a total of $28,665,000 from its project, whichever is earlier.

White Pine received an RFC loan of $57,185,000 last fall. The money will be used to develop the deposit, and to build a mill, smelter, townsite, and power plant. When in full production by the end of 1954, 36,000 tons of copper is to be produced annually. White Pine is a subsidiary of Copper Range Company of Boston.

Development of Uranium Deposits in Australia

The decision of the British Government to test an atomic weapon in Australia directs attention to the development of uranium deposits in that country.

In South Australia, the government is concentrating on the ore lode at Radium Hill in the northeast part of the state. It is also conducting searches for new deposits in several other districts. The South Australian Mines Department has begun to recruit experts for development work, and public applications have been invited for the position of mining engineer to take charge of all underground operations and to plan large-scale production. By the end of last year, a village of about 200 people had been established at Radium Hill, and it has grown steadily since.

In the Northern Territory, senior British atomic scientist Dr. C. F. Davidson recently visited the Rum Jungle uranium field, 50 miles south of Darwin. Australian geologists consider that this may be the largest uranium field in the country. The project is being developed by a private concern, Northern Drillers Company. After a four-day inspection of the field, Dr. Davidson said he thought it was probably the most favorably situated field known, and that it might well be the forerunner of other finds within a 50-mile radius. Dr. Davidson's visit was arranged by the Commonwealth Bureau of Mineral Resources.

Meanwhile, Premier Thomas Playford and Mines Director S. B. Dickinson visited the United States to get information on uranium extraction and similar matters. The exact potentials of Radium Hill and other fields are carefully guarded secrets because of their importance to national defense.

Ohio Plant to Extract Manganese From Slag

A $2,250,000 plant to extract manganese from open hearth slag will be built by Ohio Manganese, Inc. at Youngstown, Ohio. A certificate of necessity permitting an accelerated amortization of 80 percent of the cost has been granted by the National Production Authority. The firm has been experimenting for several years with the possibility of taking manganese from slag. Maurice W. Joyce, a Youngstown businessman, is president of the company.

Canadian Paper Firm Opens Mining Department

Abitibi Power & Paper Company, a Canadian firm, has opened a mineral exploration department, and, over the next few years, plans a reconnaissance of mineral possibilities of its holdings in northwestern Ontario.

Abitibi is very likely the first paper company in Ontario to go into the mining business, although Anglo-Newfoundland Development Company, Ltd. has a 50 percent interest in a Newfoundland mine. The three-year program under the direction of C. C. Houston will center on an area northwest of Port Arthur and Fort William.

Japan To Get Iron Ore From the Philippines

Japan will get iron ore from the Philippine Islands under an agreement between the Yawata, Fuji, and Nippon Steel Pipe Companies and the Philippines Iron Mine Company. The $1,000,000 contract provides technical equipment and assistance from the Japanese in return for the iron ore from the Larep mine.

It is reported that 3,000,000 tons of iron ore will be bought during the three-year period beginning in July 1952. During the first year, 750,000 tons will be bought, increasing to 1,000,000 tons in the second year, and 1,250,000 tons in the third year. Price is set at $9.75 per ton for the first million tons.

ELIZALDE & COMPANY BECOMING MAJOR IRON ORE PRODUCER IN PHILIPPINES

The Elizalde mining interests are forging ahead rapidly as the company is well on its way to becoming the major iron ore producer in the Philippine Islands. By the end of 1952, the company expects to be shipping between 80,000 and 100,000 tons of iron ore per month.

According to Jesus Cabarrus, executive vice president of Elizalde and Company, Inc., the Samar Mining Company, operated by Elizalde, is averaging shipments of 40,000 tons of iron ore per month to Japan, while the Marinduque iron mine, located on the island of Marinduque, is producing 12,000 tons of ore per month, and will be increased to 18,000 tons as soon as additional equipment is received. The ore from Samar averages 55 percent iron and from Marinduque 65 percent.

Elizalde recently acquired a large group of claims near Aparri on the northern end of Luzon where they found large deposits of ore. Several officials of the company are now in Japan arranging a contract for the sale of this ore. On the islands of Homonhon and Mancani, off the coast of Minanao, the company owns and has under development two large lateritic deposits which are reported to average 48 percent iron, 0.5 percent nickel, 2 percent chrome, 10 to 20 percent silica, and a trace of cobalt. Test shipments of this ore have been made to Japan and it is hoped that a process will soon be found whereby large tonnages of the ore can be used.

The company also is opening up the Davao gold property, one of the noted Philippine gold producers before the war. Right after the war, the property was under contract to Panaminas, Inc., but operations were suspended after about three years because of the unsettled political conditions in the Philippines. Elizalde is driving a long tunnel to open up ore bodes at depth. Reserves are reported to be around 250,000 tons with a gross value of $24 per ton. Values are in gold, copper, lead, and zinc.

An extensive examination and exploration program is also being carried out. Examination work in Zamboanga has shown an iron and manganese deposit which has promise and on the island of Marinduque several showings of copper have been found.

Manuel Elizalde is president of Elizalde and Company; Jacobo Cabarrus is treasurer; and Eric Lenze, who was with the Haussermann interests for 18 years, is manager of mining operations.

Rand Gold Mines Expand Uranium Recovery Program

Uranium production in South Africa is expected to expand considerably. The mines which have already started programs to recover by-product uranium from gold are increasing their treatment plant capacity and a new agreement provides funds for additional installations at several other Rand gold mines.

Discussions between governments of the United Kingdom, the United States, and the Union of South Africa, have resulted in agreements under which these additional plants will be financed from British and American funds. Repayment will be made in uranium concentrate. (London reports indicate that the agreement is along the same lines of a 1948 agreement between British and Canadian interest for expansion of aluminum output.)

The uranium price will be fixed on a cost-plus basis which will lead to greater profits for all mines. Stilfontein Gold Mining Company, Ltd. and West Driefontein Golding Mining Company, Ltd. are the latest to announce plans to recover by-product uranium. First recovery from the Rand will begin before the end of this year.

Strict secrecy is being observed about uranium recovery but it is known that West Rand Consolidated Mines, Ltd. has already spent £600,000 on an extraction plant. There is also an unofficial report that a large central plant for further treatment of uranium concentrates is being erected.

Yugoslavian Explorations Uncover Mineral Wealth

Intensive geological explorations in Yugoslavia have shown that Montenegro possesses vast mineral wealth. Coal reserves in the Pljevla region amount to over 200,000,000 tons, and known bauxite reserves are about 100,000,000 tons.

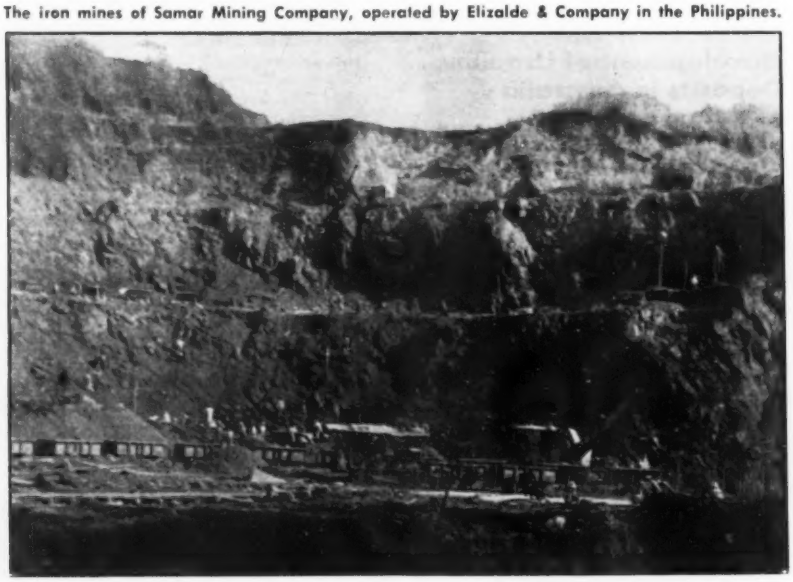
Near Petrovac, a montmorillonite mine has been opened with reserves estimated at 25,000,000 tons. Manganese is reported near Budva, and iron ore near Pastrovicka. Oil has also been discovered in the Pastrovicka region, and a third well will soon be sunk. Prospecting for iron ore, manganese, and barites will continue in the mountains of northern Montenegro.

The newly opened Suplja Stijena mine has reserves estimated at 440,000 tons. These are in lead and zinc with 9 percent lead, and 16 percent zinc.

Possible Beryl Deposit Discovered in Spain

Vincente Fernández Soler of Córdoba, Spain, has discovered a beryl-rich pegmatite dike with float-indications of tin and tantalum, while prospecting in La Coruña province in northwestern Spain. The dike is three meters wide and is reported to be rich in quartz, feldspar, mica, and beryl. Because reports of preliminary sampling claim appreciable beryl values and because of the proximity of seaport facilities, more extensive exploration is planned.

The iron mines of Samar Mining Company, operated by Elizalde & Company in the Philippines.



U.S. Reopens Nicaro Nickel Plant in Cuba

The Nicaro nickel plant in Cuba is back in operation again after a five-year shutdown. Four of its 12 blast furnaces are in production, with a capacity in excess of 800,000 pounds a month. Full operation should be attained by June 1, when the plant should begin to turn out 30,000,000 pounds of nickel a year.

Nicaro was built by the United States government during World War II at a cost of $32,000,000. It cost another $10,000,000 to reopen and rehabilitate it. Its capacity has been expanded about one fourth, and tests are being made on changes in processing which may add another 10 percent or 3,000,000 pounds to annual output.

The Nickel Processing Company is operating the plant for the General Services Administration. Joining in the enterprise are the National Lead Company and a Dutch concern, N. V. Billiton Maatschappij. Nicaro Nickel Company, a subsidiary of Freeport Sulphur Company, owns the mines which are supplying the ore.

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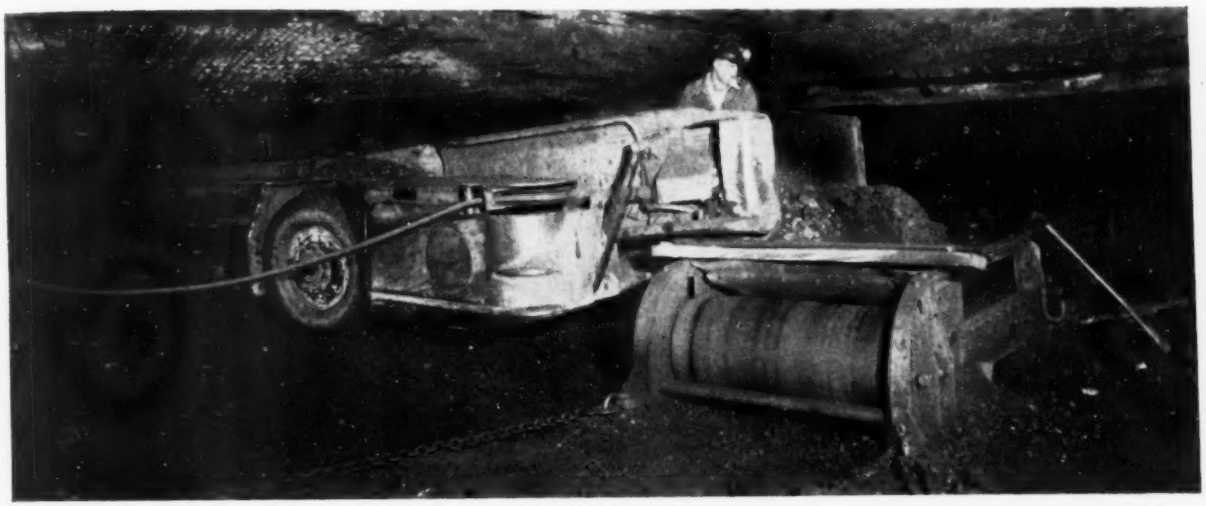

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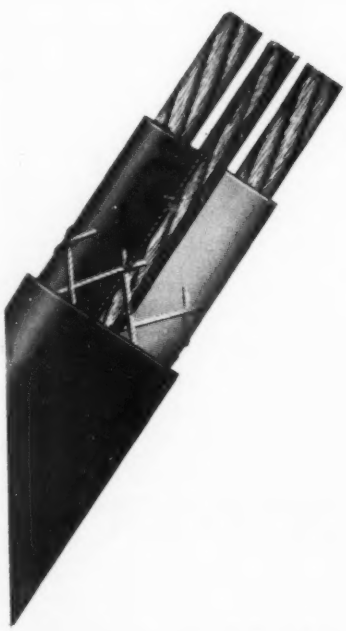

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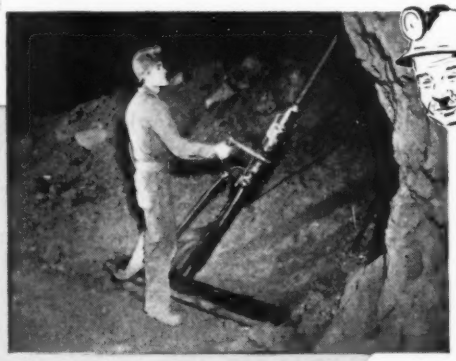

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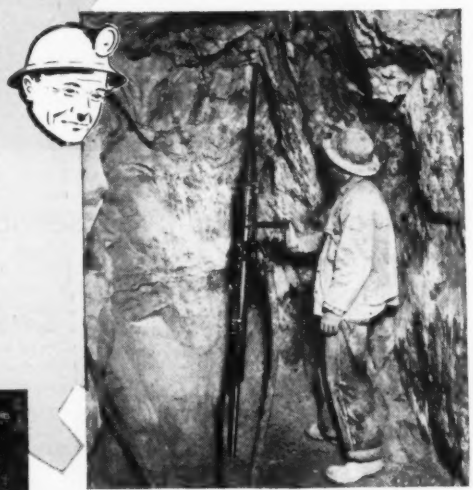

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INTERNATIONAL

NORTH AMERICA

QUEBEC—The *Arnora Sulphur Mining Corporation* has prepared and placed a diamond drill at Ivry for the purpose of testing a large deposit of titanium. It is estimated to be a 1,000,000-ton deposit running well over 500 feet below the surface. The actual drilling for the metal is being carried out by the *Inspiration Drilling and Development Company*.

SASKATCHEWAN—*Baska Uranium Mines Ltd.* intends to carry out an exploration program at its three uranium properties in the Beaverlodge-Athabaska area of Saskatchewan as soon as weather permits. Greatest part of the work will be done on its Fish Lake and Ragg's Lake properties, totalling 33 claims together.

BRITISH COLUMBIA—*Van Roi Consolidated Mines Ltd.*, now under the management of *Transcontinental Resources*, has increased its production schedule to the point where the mill now handles 110 tons of ore daily. With the addition of some heavier equipment, the rate is expected to go up to 150 tons. Under its new management the mine has been rehabilitated, ore has been blocked out and developed, and practically a whole new service plant installed.

QUEBEC—*Vermont Zinc Mines* have completed two more drill holes on their Northwestern Quebec property which have extended the drill-indicated ore length from 250 to 350 feet. In view of a decided improvement in the over-all average grade, the company has ordered a second drill to the property.

ONTARIO—*Draper Lake Frontenac Lead-Zinc Mines* of eastern Ontario are hoping to establish a base metal mine as a result of information secured in the sampling of surface trenches and diamond drilling on their property. Sampling of seven trenches has returned an average of 4.20 percent lead, 0.30 percent zinc, and 0.22 ounces of silver over an average width of 12 feet for a length of 400 feet. J. C. Dumbrille is the consulting engineer.

SASKATCHEWAN—*Nesbitt LaBine Uranium Mines Ltd.* reports new showing of pitchblende secured in completing its shaft to below the 300-foot depth. At the 150-foot level and the 275-foot level seams of pitchblende have been noted and lateral work will soon be under way on both these levels to get into potential areas. Development plans call for 1,000 feet of lateral work along strike in each direction at both levels. Extensive diamond drilling to outline anticipated "ladder" structures is also planned.

BRITISH COLUMBIA—An intensive development program designed to bring its 45-claim group south of Rossland into production has been announced by *Rossland Mining Company*, a recently incorporated company.

QUEBEC—*Quebec Chibougamau Goldfields Limited* has acquired a block of 50 claims containing 2,000 acres in the southeast part of Levy Township. The company has also taken an option on approximately 1,000 acres located on the western extension of the *Chibougamau Explorers Ltd's* ore structures. The company is undertaking geo-physical surveys on both groups as an initial step prior to diamond drilling.

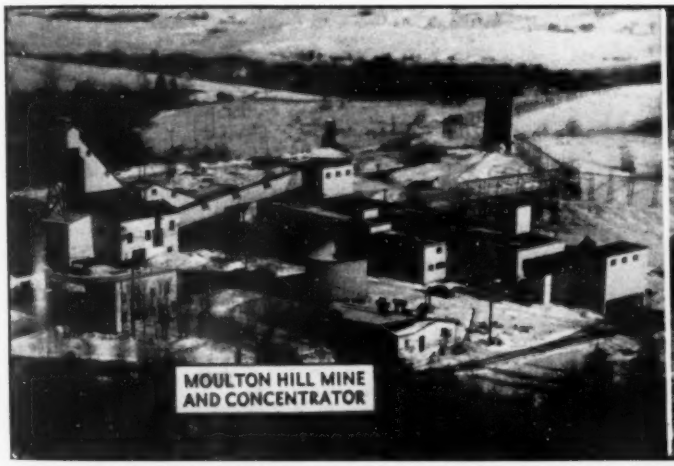
ONTARIO—*Ontario Pyrites Company* has put in motion a plan backed by almost $2,000,000 of firm financing to develop a new zinc, copper, lead, and silver mine. The program centers around the former *Treadwell Yukon* mines and adjoining Vermillion Lake properties. Drilling results from twenty years ago at Vermillion Lake indicated 1,028,000 tons of ore averaging 0.022 ounces gold, 1.58 ounces of silver, 1.49 percent copper, 0.99 percent lead and 4.70 percent zinc. Present metal prices would multiply fantastically the profit potential for the properties involved over the low metal prices which caused the old Treadwell Yukon to close in 1930. A three-shaft operation is proposed. The Nos. 1 and 2 shaft of the Treadwell sector are to be used, with an entirely new shaft to be put down to a depth of 750 feet at Vermillion Lake.

SASKATCHEWAN—During 1951, between $5,000,000 and $6,000,000 was spent in this province in a search for uranium, compared with $2,000,000 in 1950. The *Eldorado Mining & Refining Company* is building what may be the world's largest mill for refining uranium ores. It is scheduled to open next year. Plans are also under way to build a new city, Uranium City, 400 miles north of Prince Albert.

MICHIGAN—*Micha Mica Mines, Ltd.* has been organized by a local group in Grand Rapids, Michigan, to develop 4,000 acres in Halliburton, Ontario. The group is headed by A. R. Schaberg. The company is currently seeking a concern which uses mica, in the hope of arranging a joint mining venture or one on a royalty basis. The holdings are reported to contain the largest known deposit of mica in North America, with some 125,000 tons reportedly available.

BRITISH COLUMBIA—A new phase in the development of the *Silver Standard* mine, a lead and zinc property near Hazelton, British Columbia, will start soon, following completion of a 500-foot shaft, according to managing director Ridgeway Wilson of Vancouver.

ALASKA—A Vancouver group headed by Dr. Frank Hall, president, has bought the tungsten group at Devil's Elbow, 100 miles up the Stikine River from Wrangell,



MOULTON HILL MINE AND CONCENTRATOR

SUFFIELD MINE

EXPANSION AT CANADIAN PROPERTIES OF ASCOT METALS

Mill tonnage from the Moulton Hill concentrator of Ascot Metals Corporation near Sherbrooke, Quebec, is rapidly approaching its goal of 650 tons daily. Initially, all mill feed came from the Moulton Hill mine, which still provides from 200 to 250 tons per day. The opening of the Suffield mine nearby soon provided increasing amounts of ore until now it is shipping between 400 and 450 tons a day. Present plans for the Suffield are to deepen the shaft by 300 feet (two levels) and to carry on development work at these new horizons. Ascot owns two subsidiary companies—Suffield Metals Corp. and Albert Metals Corp. An adit is to be driven at the Albert mine to reach a known ore zone at a vertical depth of 750 feet. This will give 980 feet of ore on dip above the adit elevation, and will also provide a means of approach to the Eustis ore body which lies about 1,000 feet to the south. The Eustis is known to contain low-grade copper and high-grade pyrites. The company also owns the Sterrett chrome mine near St. Cyr, Quebec, which may be a promising asbestos producer.

Alaska, and will have the property examined this spring. Joseph Mandy is managing director. Peter Hamlin of Lower Post, British Columbia, was the vendor of the claims. River boats plying the Stikine three times a week give access to the area during the open season.

BRITISH COLUMBIA—The new mill of *Kootenay Base Metals Ltd.* at Cranbrook is in operation and all phases of the company's operations are proceeding satisfactorily, according to *Transcontinental Resources, Ltd.* of Vancouver, developers of the property.

NORTHWEST TERRITORIES—Shaft sinking and underground work at the Matthews Lake property of *Salmita Consolidated Mines* during 1951 proved the existence of the B vein at depth, with excellent possibilities both as to value and tonnage. The company plans resumption of lateral work during 1952 to open up the B vein on the 125-foot level north and south of the shaft area; and deepening of the shaft to open up a second level at the 250-foot horizon, in conjunction with purchase and installation of milling equipment. The company has completed negotiations for the purchase of a mill of 100 to 125-tons daily capacity, and is aiming for first production in the fall of 1952. As a follow-up ore development program, the consulting engineer, Frank W. Anderson, has recommended investigation at depth by diamond drilling of the Olsen vein and the sinking of another shaft in this area if results warrant it.

ONTARIO—*Fab Metal Mines* has begun diamond drilling on its property in Parkin Township near Sudbury. To date a length of 1,800 feet has been tested in the copper-zinc-silver mineralized zone with maximum core length of 149 feet and minimum of 62 feet intersecting the zone at an approximate depth of 150 feet. All holes show zinc and copper with assays in silver up to one ounce over three- and four-foot sections.

NEVADA—A new mill to process fluorspar—the first in the state of Nevada—will be built by *Kaiser Aluminum & Chemical Corporation.* Fluorspar will come from the *Baxter* mine which Kaiser recently purchased from *H. W. Gould & Co.* The mill will also have sufficient capacity to handle ore purchased from other Nevada deposits.

BRITISH COLUMBIA—Despite a 21-foot snowfall and continued cold weather, *Indian* mine in the Portland Canal district of British Columbia expects to ship ore to the *Silbak* mill soon. The tramline recently shifted from the *Premier* operations is now working smoothly. Plans call for extraction of ore from six oreshoots on the No. 1 level. Fred J. Hemsworth is consulting engineer. The property is operated by *Silbak-Premier Mines.*

ONTARIO—A new gold strike of *Tombill Gold Mines* and *Prospectors Airways Company* in the Beardmore-Long Lac region promises intensive development, according to the official maps and data released recently. The gold strike was made in a series of three trenches, the most easterly and best of which ran 0.802 ounces of gold over 12 feet in sampling at the surface. The showing was of such richness that the two engineers, C. L. Coleman and W. S. Hargraf, decided that there was no need for further sampling.

QUEBEC—Plans for a $12,500,000 zinc refinery in Quebec are about completed. A final decision is yet to be made on the plant site but it will be in the St. Lawrence River area. This first zinc refinery in eastern Canada will raise the country's refined zinc for sale by about 75,000,000 pounds a year. A large part of Canada's annual output of about 670,000,000 pounds of zinc emerges in the east; but both of the country's refineries lie west of the Great Lakes—*Hudson Bay Mining and Smelting Company, Ltd.* at Flin Flon, Manitoba and Cominco's smelter at Trail, British Columbia. Golden Manitou Mines and American Zinc, Lead and Smelting Company, which have brought this project to its present stage, will own all the common shares. About 22 months will be required to complete the refinery.

MINNESOTA—A $300,000,000 project to produce up to 10,500,000 tons annually of iron ore pellets from taconite is under consideration by the *Erie Mining Company.* The program would call for construction of a plant on the Mesabi Range northeast of Aurora, Minnesota, where the company has been operating a preliminary experimental taconite plant for several years.

ONTARIO—Short hole drilling into the ore at *East Rim Nickel Mines* is giving excellent results in confirming estimated ore measures. Ore calculations based on the $500,000 development program of the

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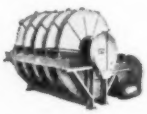
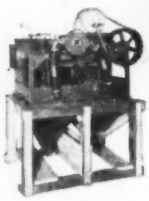
Denver Ore Feeders

Denver Steel-Head Ball Mills


Denver Disc Filters

DENVER FORCED FEED Jaw Crushers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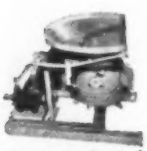
Denver Mechanical Gold Pan

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(Type "H"—anti-friction bumper bearings, bronze side bearings.)

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3¼" x 4½"	10" x 16"
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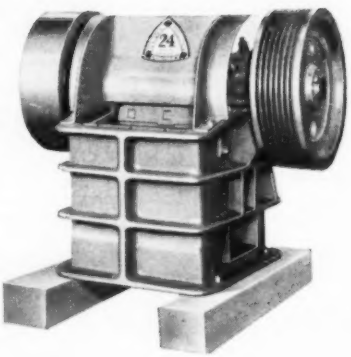
Sizes:

(Type "J"—anti-friction bearing crusher.)

10" x 24"	18" x 36"
10" x 36"	21" x 36"
15" x 24"	21" x 40"
15" x 36"	25" x 40"
18" x 24"	32" x 40"



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last year are 1,076,500 tons averaging 1.38 percent nickel and 0.54 percent copper. The shaft is now being deepened to open a third level at depth of 550 feet and to establish loading pockets below that horizon. Surface diamond drilling to the northwest and southeast of the shaft have given good indications of other main orebodies.

BRITISH COLUMBIA—*Cronin-Babine Mines* near Smithers has made a deal with *British Metals Corporation (Canada) Ltd.* whereby the latter will provide funds for development until concentrates are shipped.

ONTARIO—An important new ore source has been recently found in drilling at *Anacon Lead Mines*. At the 400-foot horizon, two drill holes, 200 feet apart, have "clicked" with excellent lead-zinc values. It is believed the wide new ore section represents the extension of another ore body. M. J. Boylen is president of Anacon Lead Mines.

NORTHERN TERRITORY—*Drilling and Development (Tennant Creek)* N.L. has an option over two 20-acre leases at Bynoe Harbour, 70 miles southwest of Darwin. The area is being worked for tapiolite ($FeTA_2O_6$). A tantalum ore.

EUROPE

GREECE—*Mediterranean Mines Inc.*, with mines in the Laurium district of Greece, reports that recent exploration has revealed new ore in several places. Their 250-ton mill is now in operation, with mill feed being drawn from three locations, all extensions of old workings.

EIRE—*Abbeytown Mining Company, Ltd.* at Ballisodare, Sligo county, is milling a low-grade lead-zinc ore. Production was recently stepped up from 100 tons per day to 240 tons per day.

SPAIN—Wolframite is now being produced at the rate of 160 tons per month, compared with approximately 400 tons per month during World War II. In 1951, Spain exported 121 tons to the United States.

NORWAY—A new plant which will produce 3,000 tons of magnesium this year is being constructed by Norway's largest electro-chemical manufacturing company, *Norsk Hydro*, at Heröya. Production will be increased to 5,000 tons in 1953. Most of the magnesium will be exported to the United States.

YUGOSLAVIA—With the exception of a limited number of products, such as specified coals and a few ores which are scarce, all industrial and mining products will be on free sale in the wholesale market in 1952. Until now, the purchase of these products had been strictly planned, with higher economic bodies assigning buyers to manufacturing enterprises. Under this new government decree, these enterprises will be able to sell their products freely at market prices.

ITALY—No license for the import-export of copper, zinc, nickel, and cobalt can be issued unless prior approval is received by the Ministry of Industry. This ruling is in accordance with Italian adherence to international allocations.

EIRE—*Silvermines Lead and Zinc Company Ltd.* in Tipperary county is working a lead deposit and an oxidized (calamine) zinc ore. The lead ore is milled at the rate of 200 tons per day, and the calamine treated in a small Waelz plant at the rate of about 40 to 50 tons per day.

SWEDEN—The *Boliden Mining Company* has opened up a zinc and lead mine at Östra Högkulla, Norsjö, in northern Sweden. The annual output will be about 10,000 tons of ore during the first seven-year period. The ore is transported to Boliden for concentration. The same firm will also increase its production of lead at the *Laisvall* mine in northern Sweden from the present 250,000 tons to 420,000 tons per year in 1954 and 1955.

PORTUGAL—Exports of tungsten totaled 3,613 tons during the period from January to November 1951, compared with 2,813 tons in the same period of 1950. Shipments to the United States amounted to 1,474 while Great Britain received 1,988, Sweden 73, Germany 20, Belgium 12, Italy 11, and a number of unspecified countries took 35 tons between them. These exports were valued at 467,117,000 escudos, as compared with 71,177,000 during that same period of 1950.

ENGLAND—In Cornwall, *Minerals Re-*

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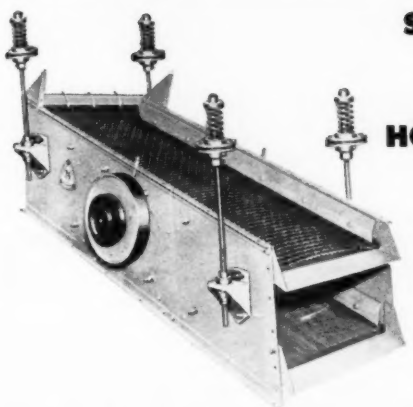

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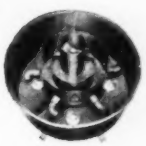
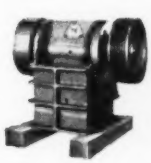

Denver Pulp Distributor

Denver Thickeners


Denver Jaw Crushers

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covery Ltd. has completed a small plant near Camborne for the treatment of beach sands in the St. Ives Bay which contain cassiterite. The plant has been in operation for a few months. The scale of operations is small at present, but if it proves successful it is planned to increase the capacity considerably. The beach sands in this area have been the object of much attention from time to time. A 300-ton-per-day plant was in operation for several years at Gwithian, at one end of the bay. A variety of minerals are present, including fluorspar. Some have undoubtedly been derived from old mine tailings washed downstream into the bay, but some appear to have come from lode outcrops. There has been much speculation about the source of this material and the possibility of undersea outcrops.

NORWAY—A/S *Titania* plans to construct a new pig iron plant at Sokndal with a capacity of about 30,000 metric tons a year. A new method will extract 30 percent iron from a titaniferous iron ore.

YUGOSLAVIA—An official of the Yugoslavian Embassy in Washington, D.C. denied reports from Vienna that the copper mines of Yugoslavia are below prewar production. Released government figures showed that production at the *Bor* mines in 1946 were 21,978 metric tons; 37,770 tons in 1947; 36,870 tons in 1948; and 34,384 tons in 1949. Prewar production was around 40,000 metric tons annually. Yugoslavia is planning rapid expansion of her metal output in 1952. Operations will start this year in three new lead and zinc works in Serbia where the main ore deposits lie. More than 1,000,000 dinars will be invested in the Bor copper mines. Projects include an increase in capacity of the new electrolysis plant by 200 percent by August 1; the construction of an 8-kilometer cable railway between Bor and Vuchje; improvements in foundry operations with a consequent saving of 40 percent in coke consumption; and the exploitation of new orebodies. The copper-rolling mills in Sevojno, near Titovo Uzice, are raising their capacity to 24,000 tons of copper and brass semi-manufacturers, and will be able to cover all of Yugoslavia's requirements.

EIRE—The Government's exploratory project at Avoca has reached a depth of 900 feet to win copper, lead, zinc, and pyrite from old and formerly proved sources. Previous to 1880, this ore body, which is 6 miles long and ¼ mile wide, was actively worked.

BELGIUM—The *Societe Generale de Belgique*, the leading bank in Belgium, reports the smelter output for 1951 as follows: zinc, 200,000 metric tons; copper, 191,000 metric tons; lead, 65,000 metric tons. Most of the zinc and copper came from the mines operated by *Union Miniere du Haut Katanga* in the Belgian Congo, while some of the lead came from South West Africa.

SWEDEN—The *Korsnäs Mining Company* has acquired mining rights to some new zinc deposits at the *Homlmenstorp* mine in central Sweden.

HUNGARY—Construction of the largest blast furnace in Hungary has been started at the *Diósgyör* steel works. A rolling mill is among other installations also planned. Last year, three open hearth furnaces and an electric furnace were installed at Diósgyör under the Five-Year Plan.

ENGLAND—Some attention is being given to tungsten alluvials on the Bodmin Moor in the center of Cornwall and around Kit Hill on the border of Devon county near Plymouth. Although it was announced almost a year ago that the Ministry of Supply would resume tungsten mining in Devonshire, presumably referring to the *Hemerdon* mine owned by the Government, to date nothing has been done, despite the high price of tungsten. In 1945, it was estimated that at least 4,000,000 tons of low-grade ore were available and a plant was erected at a cost of £1,000,000 which is still intact and in good condition. A group from the Cornish Mining Development Association had a conference with Lord Swinton, Chancellor of the Duchy of Lancaster, to discuss the contribution which the unmined mineral reserves in Cornwall and Devon could make to relieve metal shortages.

SPAIN—*Aluminio Ibérico* has been formed by Spanish and Canadian interests to produce aluminium plates, shapes, and wire, as well as aluminium goods, mostly from imported metal. The imports

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will be paid for by exports of aluminium goods. *Manufacturas Metalicas Madrilenas* is the Spanish concern connected with the enterprise.

NORWAY—The director of *A/S Norsk Bergverk*, the Government-owned mining company, states that it will take about five years and will cost some £12,500,000 to open up the *Dunderland* iron ore deposits in Nordland Province. The deposits are estimated to contain some 1,000,000 tons of iron ore and will supply the *Mo I Rana* iron and steel works under construction nearby.

EIRE—The *Wicklow Mining Company* in Glendalough, Wicklow county, are developing a high-grade lead-zinc ore. They plan to treat the ore in a flotation plant. Currently developing a low-grade lead-zinc-pyrite ore is the *Thornton Mining Company, Ltd.* at Manorhamilton in Leitrim county. This firm is considering the installation of a small flotation plant. *Benbulben Barytes, Ltd.* at Glencar, Sligo county, is shipping crude baryte to Scotland.

SWEDEN—Rich uranium deposits are reported to have been discovered at Kvarntorp, west of Stockholm. Harry Brynielsson, director of the *Atomic Energy Company*, said that the find was in heavy shale deposits and contained about 175 grams a ton. Some samples ran as high as 3,000 grams a ton in uranium content. The Atomic Energy Company is half-owned by the Government.

ITALY—Sulphur producers are protesting the Government's policy of restricting sulphur exports toward the sterling area. It is contended that Greece and Egypt want large amounts of Italian sulphur but licenses are denied. On the other hand, Italian sulphur is non-competitive in the dollar area because American sulphur prices are much lower. Since the sulphur is under international allocation, Italian policies must be coordinated with those of other producing and exporting countries.

EAST GERMANY—The *Aue* uranium ore deposits are reported to have been exhausted and the Soviet-controlled mining company, *Wismut A. G.*, has transferred its headquarters to Saalfield, where other deposits are reported to have been discovered. Most of the underground miners are said to have been moved, too.

NORWAY—The *South-Varanger* iron ore mines at Kirkenes in northern Norway have just resumed production. This year's production target is about 500,000 tons of export ore worth almost £2,000,000. Most of the ore will go to Western Germany and Great Britain. Next year, full production will be reached with an output of about 1,000,000 tons. The mines will then employ about 900 people. The South Varanger mines are the largest in Norway. They have had to be almost totally reconstructed after wartime damage.

YUGOSLAVIA—Work has been started on the installation of the first of five new rolling mills for seamless tubing at the *Sisak* steel works. 435,000,000 dinars have been allocated to the works, the largest in Yugoslavia, for capital expenditure this year.

GERMANY—The *Toeging* works of the *Vereinigte Aluminiumwerke*, Western Germany's largest aluminium smelting plant, produced twice as much during 1951 as it had in 1950. The company, which has a basic capacity of 42,000 tons, produced 30,000 in 1951, compared with 15,000 in 1950. Of the 162 electrolytic smelters it possesses, 90 have been repaired and 72 more will be completed this spring. Only then can the plant go into full production. The company formerly procured bauxite from its own mines in Hungary; it now buys most of what it needs from Yugoslavia and Greece.

LATIN AMERICA

PERU—The *Milpo Mining Company* is installing a concentrating plant with a daily capacity of 100 tons to produce zinc and lead concentrates.

MEXICO—Reports indicate that the *Hearst* mining interests are planning to construct a $150,000 fluorspar treatment plant at Agua Prieta in Sonora, Mexico, just across the border from Douglas, Arizona. One of the principal shippers would be R. S. Clinch of Nacozari, Sonora. At present, shipments of fluorspar through the Douglas port of entry have been running about 50 tons of ore daily, and it is believed that production in the area will be stimulated materially by the erecting of a processing plant.

BRAZIL—New beryl-bearing pegmatites have been discovered in the northern part of the state of Sao Paulo. Beryl found here is associated with feldspar, mica, quartz, tourmaline, and some varieties of phosphate minerals. Beryl crystals of about one foot in width have been found in Bairro dos Pimentas, three miles from the city of Sao Luiz do Paraitinga. The whole area has been carefully studied because the pegmatites are scattered through the region. Some of the mica blocks, together with the beryl, are of good commercial quality.

CUBA—The *Lengua de Patira* nickel mines have reopened. More than 2,000 workers are employed. Under a new agreement signed with the company, the workers will receive a 49 percent wage increase.

VENEZUELA—Bauxite fields reported to contain an estimated 2,000,000 tons of high-quality ore have been found north of Upata in Venezuelan Guiana. The Venezuelan Ministry of Mines is said to have made the discovery.

JAMAICA—A mining concern from the United States is seeking a 25-year lease from the Government of Jamaica to mine manganese over eight square miles in Portland, on the north side of the island.

MEXICO—Development work is being arranged for a nickel-cobalt deposit recently obtained by *Estano Mexicano*, S.A. near Culiacan, Sinaloa. Colonel Hilario Millan is president of the concern.

CHILE—The *Production Development Corporation* has decided to spend 3,500,000 Chilean pesos to increase exploration for uranium. The presence of possible deposits of uranium in the provinces of Atacama and Coquimbo had been announced previously.

BRAZIL—A plant for producing electrolytic copper is being completed at Utinga in the state of Sao Paulo. The plant will process ore from Camaqua in the state of Rio Grande do Sul where reserves are estimated at 500,000 tons, and malachite ore from Itapeva in Sao Paulo. Itapeva's reserves are estimated at 200,000 tons, while probable reserves of one percent ore are as high as 40,000,000 tons in Caraiba, state of Bahia. Production should begin by the end of 1952. The plant will have a 5,000-ton-per-year capacity, using 3,000 tons of concentrate from Camaqua and 2,000 tons of imported ore, as well as scrap from the area around Sao Paulo. Possibly some of the ore will come from Bolivia over a new railway which has recently been completed between Sao Paulo and that country.

MODERN MINING COMMUNITY IN NORWAY

These dwellings, constructed after World War II for the miners at Fosdalen Bergverk A/S in Malm, North Trondelag, Norway, are a sample of modern living in a Norwegian mining community. Except for the properties of A/S Sydvaranger, Fosdalen is the most important iron mine in the country. Like other mines in the nation, Fosdalen is aiming for higher production of iron and pyrite concentrates during 1952.

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PERU—The *Volcan Mines Company* has started the construction of a mill for the concentration of lead and zinc ore in Ticlio, with a daily output of 350 tons.

MEXICO—Though handicapped by lack of sufficient water, *Cia. Bisentungsteno S.A.* is recovering some 350 kilograms of tungsten concentrate daily, averaging 70 percent tungsten, from its properties near Leon, Guanajuato. A 50-ton mill is operating on the property. Efforts are being made to bring water supplies to par by well drilling. G. M. Wasteneys is manager.

VENEZUELA—The *Orinoco Mining Company* has awarded a contract to the *Link-Belt Company* for the design and construction of an iron ore handling and storage system at Puerto Ordaz, Venezuela. The system would receive ore from freight cars that had been loaded at Orinoco's mines at Cerro Bolivar; handle it through crushing, screening, and storage operations; and load it into ocean-going ships at Puerto Ordaz for transportation to ports in the United States. *McDowell Company, S.A.* of Caracas, and *Wellman Engineering Company* of Cleveland, Ohio, are associated with Link-Belt in this project.

BRAZIL—The bauxite deposits in the Poços de Caldas Plateau, state of Minas Gerais, will be sufficient to supply the large aluminum industry which is almost ready to start operation in Brazil. Proved reserves in one of the bauxite fields of Poços de Caldas reach 10,000,000 tons. The first aluminum industry in Brazil (Ouro Preto, state of Minas Gerais) got off a false start and the plant, started in 1946, was forced to stop production after six months. This plant, recently sold to *Aluminio do Brasil S.A.*, a subsidiary of the *Aluminum Union Ltd.* of Canada, was completely rebuilt and it has been in operation since last October. The above company will operate another plant at Utinga, state of São Paulo, by mid-1952. Another very promising initiative is that of *Companhia Brasileira de Aluminio*, at Aluminio, state of São Paulo. It will use modern equipment to produce aluminum ware and aluminum conductors and cables. To start, the yearly capacity will be 20,000 tons. Ore will come from Poços de Caldas, where the company operates its own mines. Facilities are already secured for an expansion to 40,000 tons.

MEXICO—A new Diesel power plant has gone into operation at the *Huatamoc* lead and zinc mine three miles west of Batuch, Sonora. The mine is the largest in the area with a mill capacity of 100 tons of lead and zinc ore per day. Combined lead-zinc content has been running between 24 and 28 percent. The mine is reported to have an estimated broken ore tonnage of 100,000 to 120,000 tons. Concentrates are trucked to Hermosillo, about 60 miles away, where they are transferred to rail. A recent shortage of ore cars has kept shipments down. Gratton Lynch is manager of the operation and Jack Hamilton is mill consultant.

CHILE—The *Production Development Corporation* (CORFO) has reported that the mining industry will bring in $45,000,000 in revenue during 1952. In 1951, this same industry brought in $32,000,000. The revenue was derived from 25,000 tons of copper at $1,100 per ton, and concentrated lead, manganese, and sulfur at $120 per ton.

PERU—The *Sindicato Minero Rio Pallanga* (Mining Syndicate of Pallanga River) has increased the capacity of its mill from 80 to 150 tons daily of lead and zinc ore.

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VENEZUELA—Exploratory work done on the *Maria Luisa* property of the *M. A. Hanna Company* "has indicated a substantial tonnage of iron ore of acceptable grade and the property is being purchased by a company owned jointly by *Republic Steel Corporation* and Hanna." This property will susbtantially increase the reserves which Hanna has owned in the same general district for the last 20 years.

BRAZIL—Some of the scheelite, mica, tantalite, and beryl mines located in the northeastern part of the country, which had produced many tons of strategic and essential ores and then had suspended operations, are back in production again. This is because the domestic demand for beryl is increasing every day, although Brazil is not yet treating this mineral, as she has done with monazite, in plants in the city of São Paulo.

MEXICO—Preparations are being made by *Cia. Minas y Beneficios*, S.A. to exploit a fluorspar deposit at Zacualapan, Guerrero. The *American Smelting and Refining Company* and *Mexican DuPont* are reportedly interested in a re-discovered fluorite deposit near Rosita, Coahuila.

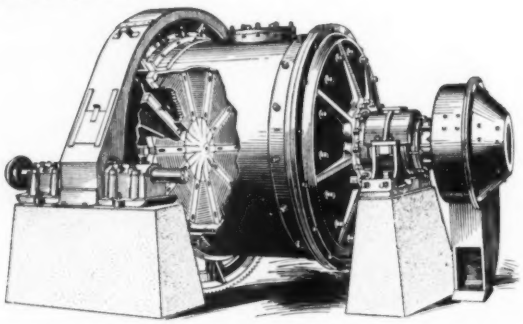
VENEZUELA—Iron ore mined in Venezuela during 1951 passed the 1,000,000-ton mark for the first time. *Iron Mines Company of Venezuela*, a subsidiary of *Bethlehem Steel Corporation*, reports a total production of 1,125,965 metric tons from January to November. About 700,000 tons were shipped to the United States.

COLOMBIA—Production figures for 1951 for the three *Placer Development, Ltd.* (of Canada) subsidiaries, *Nechi Consolidated Dredging, Ltd.*, *Asnazu Gold Dredging Ltd.*, and *Pato Consolidated Gold Dredging Ltd.* are as follows:—Pato—15,230,000 cubic yards dredged for a recovery of 107,670 fine ounces of gold; Nechi—4,631,000 cubic yards dredged for a recovery of 21,119 ounces of fine gold; Asnazu—5,887,500 cubic yards dredged for a recovery of 18,725 fine ounces of gold; and Pato—18,976,500 cubic yards dredged for a recovery of 175,164 fine ounces of gold.

MEXICO—*Fundidora Veracruzana* S.A., the iron and steel works soon to go into production at the port of Vera Cruz, has been exempt from state taxes for 10 years by decree of Governor Marco Antonio Munoz because he regards the works as an industry essential to the state's progress. The plant will be supplied by iron deposits in Vera Cruz and Oaxaca.

COLOMBIA—The Government-owned mines of Marmato in the Department of Caldas are having operating difficulties because of the high cost of supplies and labor problems. Marmato is one of the oldest known gold mines in South America and was being worked by the Indians when the Spaniards first arrived in the area in the early 16th century. Exact total production from Marmato is not known but estimates have been made ranging from 50,000,000 grams to as high as 200,000,000 grams.

the "low down" on grinding



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Calaveras Cement Co.
Cananea Consolidated Copper Co.
Cerro de Pasco Copper Corp.
Climax Molybdenum Corporation
Eagle Picher Mining & Smelting Co.
Hellenic Mining Co.
International Nickel Co.
Inspiration Copper Co.
Lepanto Consolidated Mining Co.
National Lead Co.
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AFRICA

ANGLO EGYPTIAN SUDAN—A manganese ore body has been discovered in the Upper Nile Province. The extent of the bed is not known yet, but at the point of intersection, it was 12 feet thick. It is reported to contain a high percentage of manganese.

AFRICA—Diamond sales in London in 1951 reached a record high of £65,057,965; the second best year was in 1950 when sales reached nearly £51,000,000. Hitherto, all sales have been conducted through the De Beers-owned *Diamond Corporation* in London. Now Dr. Williamson, owner of the *Williamson Diamond* mine in Tanganyika which produces about £4,000,000 worth a year, has said that he will sell independently because he is not satisfied with his share of the market. Negotiations are in progress to end the dispute, but it is more than possible that the monopoly of the Diamond Corporation will be broken.

SOUTHERN RHODESIA—*Connemara* mine, wholly owned by *Frobisher Limited*, reports that during 1951 the larger proportion of its mine development program was in the *Zabonkwe* section. At the year's end, approximately 50 percent of the ore was being supplied from this area. Development in the *Connemara* section was mainly preparation of known ore blocks for mining, but included a con-

nection to the Lindsley shaft on the third level. The Lindsley shaft reached a depth of 862 feet during the period and will be continued to the 13th level at a depth of 1,420 feet. On October 31, 1951, calculated ore reserves totalled 531,200 tons, averaging 0.24 ounce gold per ton. In addition, there is a further 75,400 tons of possible ore indicated by drilling.

LIBERIA—The first shipment of high-grade iron ore to Britain was made to the *Consett Iron Company, Ltd.* A cargo of 9,000 tons was the forerunner and further quantities are expected from time to time. It is hoped that during the year, about 1,000,000 tons will be exported from Liberia, of which an appreciable amount is expected to go to Britain. *Liberia Mining Company* of Monrovia mines the iron ore in the Bomi Hills.

ORANGE FREE STATE—The *Kennecott Copper Corporation* is to provide a further £3,000,000 for the *Virginia Orange Free State Gold Mining Company, Ltd.* The additional funds are required to advance the production date and to raise the initial milling capacity to 50,000 tons a month. Since November 1951, active development work has been proceeding from No. 3 shaft. Sinking has stopped temporarily at No. 2 shaft to allow development to be started from the first station cut at a depth of 2,860 feet. Development operations in progress consist of cross-cutting to reef and vertical winzing to reef below the present shaft bottom. No. 1 shaft has reached a depth of 3,591 feet and reef is now expected to be cut at 3,757 feet. The shaft will be continued to its final depth of 4,320 feet, and will then be fully equipped.

WEST AFRICA—Particulars have been released on a new Gold Coast Minerals Duty bill which will increase duty payable by mines from £800,000 to £2,000,000 in a full year. The increase in the revenue will not come entirely from the gold mining industry; a new *ad valorem* export duty on diamonds of 6¼ percent will be levied in addition to undisclosed duties on bauxite. In fact, the present bill extends to all minerals the tax which was hitherto only imposed on gold mines. The tax is intended to stimulate production of lower-grade gold mines.

RHODESIA—A three-man financial mission has been sent to Washington, D. C. to discuss a $30,000,000 loan with officials of the *World Bank*. The money would be used to construct transportation to Rhodesian copper, chrome, and nickel mines.

TUNISIA—A pilot plant is under construction at Megrine to produce titanium oxide. To be operated by the *Societe Africaine du Titane*, it will have an annual capacity of around 960 tons.

ORANGE FREE STATE—The main excavation work and foundations for buildings of the reduction plant have been completed at the Freddies *North Lease Area, Ltd.* property. Most of the steel building structures have now been erected, along with certain machinery. In No. 1 shaft, the Basal Reef has been intersected at 4,790 feet, with average values of 162 inch-dwts. around the perimeter. Unpayable values were obtained over 17 feet of dike, and values over the rest of the perimeter averaged 210 inch-dwts. Because of faulting, the "A" Reef was not encountered, while the "B" Reef averaged 3.7 inch-dwts. at 4,405 feet.

BELGIAN CONGO—A new plant which will provide a cheaper source of dynamite for the tremendous mining industry in the Belgian Congo is to be built in the Katanga Province. The plant, the first of its kind on the African continent, will be the work of a new limited company, *AFRIDEX*, jointly controlled by the *Societe Generale de Belgique* and the *Noble Corporation*. It is the first step in a plan to free the Congo from reliance on European and United States imports of dynamite.

SOUTH AFRICA—The state-owned railways have reduced railroad car allocations to mine producers by 20 to 37½ percent and have told companies they would only get 60 percent up to the end of March and after that only 50 percent throughout the winter. Producers of chrome, manganese, and other base metals are most severely hit since they say that they have been limiting production only because of poor transportation facilities. Many of the smaller companies might have to work at a loss or shut-down entirely, while low-grade ore producers who depend upon a big output will also be seriously crippled. One company spokesman said that the real shortage is in "marshalling yards and so on—not cars."

NORTHERN RHODESIA—At the last general meeting of *Rhodesia-Katanga Company, Ltd.*, approval was given to an agreement made with the *Anglo American Corporation of South Africa, Ltd.* and others. The agreement provides that a four-year option over the *Kansanshi* mine and surrounding farm area be granted to a new company formed to undertake further exploration of the mine. If the option is exercised, Rhodesia-Katanga will receive £250,000 in cash, and a 32 percent interest in the new company free of cost.

NIGERIA—*Iantar Nigeria Company, Ltd.* reports that the new contract for columbite for 1952, provides for payment at $44.8 per unit. This is equivalent to £1,040 per ton for 65 percent columbite-tantalum pentoxide, c.i.f. New York, and compares with £832 per ton for 1951.

SOUTH AFRICA—*Northern Transvaal (Messina) Copper Exploration Limited* is continuing to diamond drill surface borehole N.C.P. 4, located to the west of the prospect winze near the common boundary with *The Messina (Transvaal) Development Company, Ltd.* At the No. 9 shaft, development on the lode on the 3rd level south has indicated that the copper-bearing ore is gradually changing into pyrite. Work is in progress to test the mineralization at depth for copper-bearing ore. On the 4th level, east of the Molly shaft, copper-bearing ore was intersected assaying 1.6 percent copper over 47 inches. An underground drill hole has intersected the continuation of this ore body toward the 5th level.

SOUTHERN RHODESIA—The expansion of asbestos mining in Southern Rhodesia and the decline in gold production has led the *Antelope* mine to investigate the possibility of switching from gold to asbestos production. The existence of serpentine, or chrysotile asbestos, deposits in the mine has been known for several years. Tests have now shown that the cross fiber, exposed in the old workings of the *Yudkin* section, and the slip fiber, known to be present to a depth of 2,000 feet between the 12th and 16th levels of the Antelope mine itself, are of good quality. These deposits and surface exposures in other parts of the property, are now being thoroughly prospected to establish their economic importance.

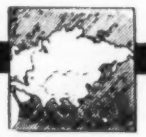
GOLD COAST—The new directors of the *Nanwa Gold Mines Limited* have done everything possible to raise the necessary funds to carry on mine opera-

NATIVE LABOR IN NIGERIAN TIN FIELDS

Natives are employed to dig and carry material to be used for building dams in the Nigerian tin fields. Pictured here is a group of natives at work at one of the placer mining operations of the Amalgamated Tin Mines of Nigeria, Limited, on the Bauchi plateau of northern Nigeria. During the six-month dry season, all water from tin washing operations is stored behind dams and reused.

tions, including obtaining the sanction of the Capital Issues Committee of the Treasury for the issue of a further £50,000 of five percent 10 Year Secured Registered Convertible Notes. The response to this latter offer resulted in some £39,000 being received, and it is hoped that the balance will soon be forthcoming. In addition, the directors were authorized to sell up to £50,000 of plant and machinery which could be conveniently sold without hindering operations. So far, the sale has not been necessary, as the African labor force has increased considerably and the grade of ore mined has greatly improved. The revenue from bullion has consequently increased and the mine is now almost breaking even on mining costs.

UGANDA—*Frobisher, Ltd.'s* holdings in the *Kilembe* project are now close to 90 percent. To bring Kilembe into production will require about $17,000,000. Negotiations are in progress with officials in Washington, D. C. to borrow $7,500,000 of this amount from a United States government agency. Some 14,000,000 to 15,000,000 tons have been indicated at Kilembe and it is estimated that with a floor price of 18 cents for copper and $1.75 for cobalt, the ore will net $6.50 per ton or $4,000,000 annually on the projected basis of a little over 2,000 tons daily. Thus, the capital requirements could be repaid in about six years while depleting only about one-fifth of the presently known ore reserves.



ASIA

INDIA—Work is scheduled to start shortly on a £450,000 silver refinery which will be the first in Asia. It will be built at Alipore in the suburbs of Calcutta and when completed will undertake extraction work for Burma and China, cutting out the flow of Indian silver to refineries in Germany, the United Kingdom, and the United States. Production is expected to start late in 1953.

JAPAN—The International Trade and Industry Ministry is reported to have arrived at a five-year plan which would increase output of tungsten and molybdenum. The annual tungsten production would be raised from 80 tons to 500 tons and molybdenum from 50 to 500. At present 11 tungsten and molybdenum mines are in operation in Japan.

THAILAND—A report on Thailand's principal mineral commodities and on undeveloped mineral prospects has been released by the United States Department of the Interior in a new Geological Survey bulletin. The data was gathered by three Department geologists and geologists of the Royal Thai Department of Mines. Listed are the country's principal commodities, produced mainly for export, as tin, tungsten, lead, zinc, antimony, and gold. Others produced for domestic use include iron, manganese and coal. The geography, physiography and geology of Thailand are included along with mining operation methods, production figures, grades, and reserves.

CHINA—Reports from Communist China say that by the use of pneumatic picks, the coal production per man-shift of *Jah-Wang Coal Mine* in Shantung Province increased from 0.63 tons in March 1951 to 0.93 tons in April 1951. It is also reported that for all of China, the number of fatalities among coal miners decreased 15 per cent in 1950 over that of 1949, while the number of injuries decreased 25 percent during that same period.

JAPAN—An estimated 2,000,000 tons of iron ore may be imported from Nevada mines by a Japanese trading company during the next fiscal year. Takashi Kataoka, chief of the metals division of the *Miyako Shoji Kaisha*, is reported to have revealed that a contract now calls for delivery of 230,000 tons, 60,000 of which have already arrived. Shipments are made through Oakland, California, and more may be shipped through the Port of Stockton, California. The Miyako Shoji Kaisha is one of the successors to the *Zaibatsu Mitsubishi Shoji Kaisha* which was broken up after World War II.

MALAYA—*Southern Kinta's* No. 1 dredge has completed trials and is now in production. The dredge is equipped with nine-cubic-foot buckets.

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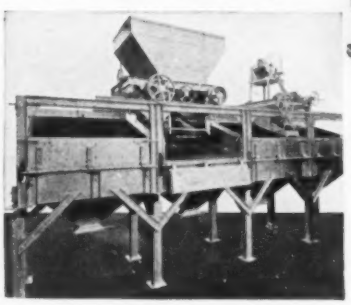

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SALEM, OHIO · U. S. A.

INDIA—A geological survey of the Sandur State is reported to have revealed iron ore deposits estimated at 130,000,000 tons. At present, only the deposits lying on the slope of the hills are being mined by open-pit methods.

HONG KONG—Hong Kong mines produced 181 long tons of ore averaging 51 percent lead and 16 ounces of silver per ton during the month of January 1952. Monthly production may be increased to 250 to 300 tons of 50 percent ore because of a vein recently discovered. This vein averages about two feet in width and 30 percent lead. It is worked by coolie methods and hand cobbed to bring up the grade. The ore is shipped to England.

JAPAN—Two Japanese companies, *Yawata Steel* and *Fuji Steel*, representing a number of other private firms, have signed a contract with representatives of the British steel industry to export 109,000 tons of steel to Britain. The cost involved is $14,000,000, at a price per ton almost double that of the current British scale. This is only a drop in the bucket of an estimated 1,500,000-ton deficiency but Winston Churchill secured a promise of an additional 1,000,000 tons from the United States when on his recent visit to Washington, D. C. Payments to Japan are supposed to be in sterling only and not in dollars.

TURKEY—Exports of chrome during 1951 totaled 400,000 tons, the greater part of the ore going to the United States. Demands from Europe are increasing and the prices for Turkish chrome ore are steadily rising. It is now quoted at around $44 to $46 per tons f.o.b. for 48 percent material, as compared with $35 to $38 a ton not long ago. The majority of Turkey's chrome mines are owned by the *Eti Bank* working under government control.

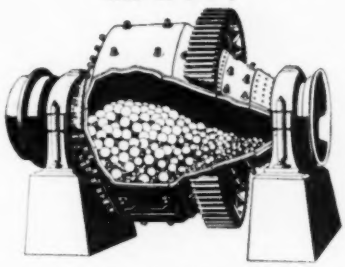
MALAYA—The *Kokan Mining Company* of Tokyo has contracted to operate the *Tamangan* iron mines of Malaya for 21 years. Under a provisional contract with *Metal Export Corporation* of New York, the Japanese concern is taking over Tamangan operations next January. The agreement calls for the Japanese to supply technicians, equipment, materials, and a $2,775,000 investment. Recently, immigration officials turned down applications of six of Kokan's employees to enter Malaya. Malaya's present policy is to keep out Japanese nationals.

INDIA—A $50,000,000 plant in Sindri, Bihar, has been opened for the production of critically needed artificial fertilizers. *Chemical Construction Corporation* of New York, an American Cyanamid subsidiary, designed and supervised building of the plant for the Government of India. When in full operation, the plant will produce more than 350,000 tons of ammonium sulfate per year, about one seventh of the nation's fertilizer needs. The plant is now operating at about one-third capacity because of a shortage of high-grade gypsum, a raw material used in making the fertilizer. Changes in facilities are planned so that it will permit the plant to operate at full capacity using the lower grades of gypsum available in India.

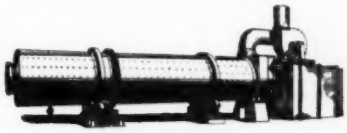
THAILAND—*Bangrin Tin Dredging Company's* No. 3 dredge will be out of commission for about three months while the bottom plates of the Pontoon are renewed.

INDONESIA—The government's Mining Commission is studying the status of tin mining on the islands of Bangka, Billiton, and Singkep off the coast of Suma-

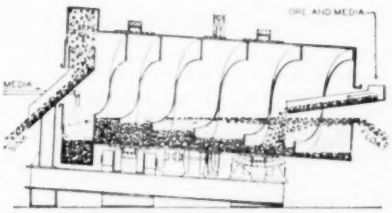
HARDINGE
has it . . .



. . . BALL, PEBBLE AND ROD MILLS
(Conical, Tricone, Cylindrical.) Write for Bulletin 17-B-3 (dry grind), AH-389-3 (wet grind), AH-414-3 (Tricone).

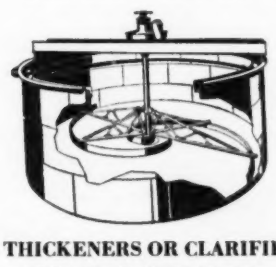


. . . ROTARY DRYERS, KILNS, COOLERS
Write for Bulletin 16-D-3.

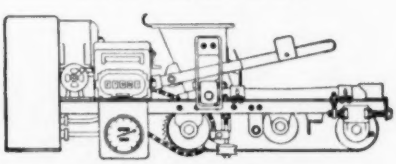


. . . WET CLASSIFIERS, HEAVY MEDIA SEPARATORS
Write for Bulletin 39-B-3.

. . . AIR CLASSIFYING SYSTEMS
Write for Bulletin 17-B-3.



. . . THICKENERS OR CLARIFIERS
Write for Bulletin 31-D-3.



. . . CONSTANT-WEIGHT FEEDERS
Write for Bulletin 33-D-3.

HARDINGE COMPANY INCORPORATED
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tra. The mines in Bangka are already owned by the government, as are about five-eighths of the mines in Billiton.

MALAYA—The chairman of the *Kajang Kemaman* tin mine in Malaya reports that the mine was closed because it was so isolated, its approach was vulnerable to attack, and its protection involved greater call on police than its importance justified. The Legislative Council in Malaya has approved a $2,940,000 (Straits) budget to combat the Communist guerrillas in the state. Some of the money will be spent on 300 armored cars, new police posts, and chemical to destroy jungle undergrowth at likely ambush spots.

HONG KONG—An average of 25,000 tons of iron ore are being shipped to Japan from the *Ma On Shan* iron mine which is located in the new territories.

JAPAN—An ore deposit 7.8 meters in width is reported to have been discovered near the adit mouth of the Sumiyoshi No. 3 level of the *Konomai* gold mine in Hokkaido. The mine is owned by the *Besshi Mining Company*, where prospecting work has been undertaken as a part of a five-year exploration plan to rehabilitate the mine.

MALAYA—At a cost of £80,000, *Kamunting Tin Dredging Ltd.* has purchased an additional area. Two Pangnga dredges will be transferred there when they have exhausted their present areas. The new ground is estimated to contain 57,000,000 cubic yards of dredgable area, with 14,390 tons of tin concentrates. Estimated life of the property with two dredges operating is 13 years. About £472,000 is involved in the cost of dismantling and moving the dredges to this area, their re-erection and re-equipment.

OCEANIA

WESTERN AUSTRALIA—Two new prospecting companies, each capitalized at £A100,000, have been formed in Adelaide to carry out mineral searches in Western Australia. They are to be known as *Cookes Creek Wolfram N.L.* and *Blue Bar Wolfram N.L. Moolyella Tin Development N.L.* has completed its new plant at Marble Bar and it is now operating on two shifts. The first shipment of tin concentrates has left Port Hedland. Since August 1951, *Golden Horse Shoe (New) Ltd.* has been treating the dump at Horse Shoe No. 1. Approximately 80,000 tons per month are now being treated for a recovery of £A12,000 per month.

NORTHERN TERRITORY—*Doria Gold Mines N.L.* at Mosquito Creek was reported to have high-grade scheelite ore exposed along the whole line of reef opened so far. According to J. R. Hylton, consulting engineer, prospects are good. The open cut had reached a depth of 24 feet with the reef still strong underfoot. In the Hatches Creek area, *Weaber's Rising Sun N.L.* is reportedly investigating a recently discovered wolfram field. Options over seven leases total 140 acres, of which at least one lease has been favorably reported upon by C. E. Blackett, consulting engineer. The company has abandoned its option on two leases in the Tennant Creek area and the plant there will be moved to the Hatches Creek leases.

VICTORIA—Gold production in Victoria amounted to 58,955 ounces during 1951. This was 532 ounces less than that produced in 1950. The state's leading producer was *Australian Consolidated N.L.* The *Wattle Gully Gold Mines N.L.* reported its throughput for last year at 19,793 tons for a recovery of 7,337 ounces of gold. Production and ore reserves were maintained. Proved reserves were 56,500 tons.

NEW SOUTH WALES—*Zircon Rutile Ltd.* at Byron Bay doubled production of zircon and rutile last year, as compared with the previous year, and they report that they are still behind in meeting the demand. At Rye Park, *Tungsten Consolidated Ltd.* has reached a depth of 97 feet in its diamond drilling program. The company reports having passed through 20 feet of ore just above the bottom of the hole. About 90,000 tons of ore are reportedly indicated.

TASMANIA—*Aberfoyle Tin N.L.* has entered into contracts with the British

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Ministry of Munitions for the disposal of its wolfram output for the next four years. *Montana Silver-Lead N.L.* reports that it proposes to recover zinc, in addition to silver-lead. A selective flotation plant is expected to be in operation by June where tailings produced now will be retreated. Two sections of the mill went into operation at the end of last year and 50 tons of concentrates were shipped. In the Gladstone district, the Commonwealth Bureau of Mineral Resources reports that marginal-grade tin deposits have been discovered. The investigations are continuing. Tin deposits at Whitemark on Flinder's Island are also being examined by the Bureau which is conducting an active prospecting program in various parts of Tasmania.

NORTHERN TERRITORY—Large deposits of bauxite are reported to be located on an aboriginal reserve in Northeast Arnhem Land. W. E. Harney, a well-known Australian scientist, says that a wartime airstrip at Coves Peninsula in Arnhem Land was actually built on solid bauxite, and that there were at least 10 square miles of the mineral on the peninsula itself, as well as millions of tons elsewhere in the area. Mr. Harney believes that mining would be easy because the deposits are close to the surface so that they could be loaded on trucks by bulldozers and taken straight to the nearby port at Melville Bay.

PHILIPPINE ISLANDS—The Philippine government is currently considering a proposal made by the *Reynolds Metals Company* in the United States. The company has suggested that the government or Filipino capitalists finance labor, building construction, land purchase and other items for a $6,000,000 plant to process aluminum from bauxite. Reynolds, in return, would supply the machinery and materials requiring dollar expenditures.

NEW GUINEA—Membership blanks for the newly organized *Gold Sellers Association* have arrived in the territory and are now available at Port Moresby, Wau, and Bulolo. The Association was formed soon after the Commonwealth Government announced that it would allow the sale of certain newly mined gold on premium markets. It is the official medium through which sale can be arranged, and membership is open to all persons carrying out gold mining operations in Australia, Papua, and New Guinea. The offices of the Association will be at the Lands Department in Port Moresby.

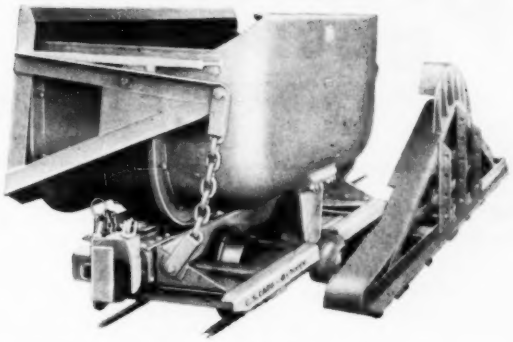
TASMANIA—*Electrolytic Zinc Company of Australasia Ltd.* has erected a pilot plant to treat zinc residue which has accumulated near the works during the many years of its operation. Successful recovery of zinc in this residue will have an important effect on the Australian zinc output. At the company's *Rosebery* mine, the mill is being expanded to treat 250,000 tons per year. Electrolytic zinc also handles the zinc concentrate output of the *Broken Hill* mines, which is approximately 80,000 tons per annum. It is interesting to note that almost half of Tasmania's hydro-electric power is consumed in the electrolytic refining plant of this industry.

NEW SOUTH WALES—*Point Lookout Antimony Mines Pty, Ltd.* has developed a large tonnage of ore for treatment when the mill is rebuilt. Some months ago, heavy rains caused the mill's foundations to collapse. High-grade ore for smelting without treatment is being extracted. The output from the mine is smelted and refined by *Messrs. O. T. Lempriere & Company, Ltd.*, at Sydney.

Lower Mine Haulage Costs

are in the

CARDS



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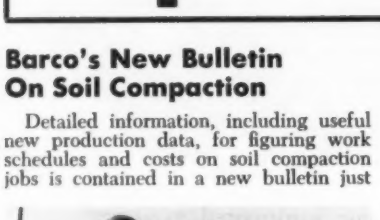
Barco's New Bulletin On Soil Compaction

Detailed information, including useful new production data, for figuring work schedules and costs on soil compaction jobs is contained in a new bulletin just



published by the Barco Manufacturing Company of Chicago covering the use of the Barco portable gasoline "Rammer" for tamping fill or back-fill in restricted areas.

Of special interest to contractors, supervising engineers, and project managers is a discussion of the use of soil compaction as a means of attaining (1) greater permanence, (2) lower costs, and (3) earlier completion dates on many construction projects. Circle no. 80.

Electrolysis Cuts Metals At Columbia University

Sectioning of metal bars by electrolytic methods—to safeguard personnel against the hazard of machine cutting of metals exposed to high levels of atomic radiation—has been accomplished at the Columbia University School of Engineering under a grant from the Atomic Energy Commission, Dr. John R. Dunning, dean of engineering, announced.

This is believed to be the first successful electrolytic cutting of metal in the United States. It was developed by George L. Kehl, associate professor of metallurgy, and Irving Moch, Jr., research associate. Professor Kehl explained: "It would be impractical to use conventional methods in cutting material which has been exposed to considerable atomic radiation, not only because of the danger to the men but also because the surroundings would be contaminated."

The method can be applied, when it is desirable, to cut metal bars without causing structural distortion on the cut surfaces. Steel bars five-eights of an inch in diameter have been cut in about 24 hours by the new process and the cut surfaces are comparable in flatness and smoothness to the results attained by moderately fine machining methods. Professor Kehl predicted that, with further development of the process, very smooth and polished surfaces can be obtained.

The process consists of making the specimen to be cut the anode in an electrolytic cell and using an appropriate electrolyte and cathode assembly. The flatness of the cut surface is produced by a novel design of cathode assembly which is the principal invention of the process. Circle no. 75.

New Device Will Measure One Millionth of An Inch

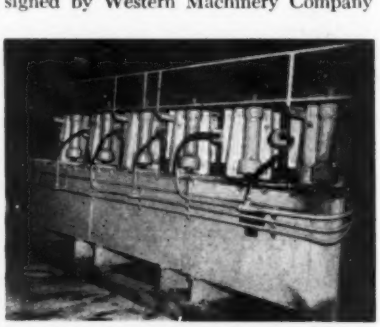
In their efforts to make their roller bearings meet the most exacting specifications, Timken has perfected a measuring machine that will measure both smoothness and curvature within one millionth of an inch.

With multi-billion dollar figures dropped casually in discussions of national debts and the like, Timken is quick to point out that one millionth of an inch is of more than casual consideration. It represents a thickness forty-six thousand times thinner than a thin dime or three thousand times less than that of a single sheet of newsprint.

The new machine, called a Pliograph, uses a diamond needle, a tiny beam of light, photographic film, and, as most such magical devices must, a series of mirrors. Permanent records of the tests may be kept as visual proof of the excellence of Timken's tapered roller bearings. If you want more information on the latest of mechanical rulers, circle no. 62.

Wemco's Attrition Machine Is New Ore Dressing Tool

On the basis of field operations near Fallon, Nevada, the attrition machine designed by Western Machinery Company

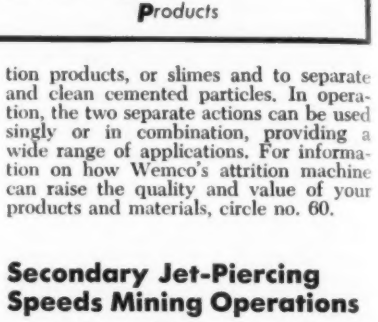


has proved to be an entirely new, and highly valuable addition to the machines available to the mineral dressing industry.

The device was built to answer the need for a unit to cleanse particle surfaces from undesirable reagents, oxidation products, or slimes and to separate and clean cemented particles. In operation, the two separate actions can be used singly or in combination, providing a wide range of applications. For information on how Wemco's attrition machine can raise the quality and value of your products and materials, circle no. 60.

Secondary Jet-Piercing Speeds Mining Operations

Secondary blasting in hard and abrasive rocks has always been an expensive problem in large scale operations. When troublesome boulders are produced



by primary blasting and the rock is amenable to spalling, Linde Air Products' new hand-held blowpipes are solving breaking problems with drilling speeds up to 60 feet per hour.

The development of a new self-contained, portable unit that operates up to four blowpipes, has given jet-piercing the mobility and maneuverability it once lacked. For complete information on the many uses of mining's newest drilling method, circle no. 25.

Experimental High-Speed Diesel Indicates Trends

A report concerning research on the experimental light weight, six cylinder, 401-cubic-inch Cummins Diesel engine that develops 345 hp. at 4,000 rpm, was highlighted in a paper presented by N. M. Reiners, manager of the Cummins research laboratory, to the Society of Automotive Engineers' meeting at the Springs Hotel, French Lick, Indiana.

He emphasized that the engine is purely an experimental model and currently not intended for production. The experiments, however, had demonstrated that the present highly developed Diesel engine is still far from its ultimate lowest weight to power ratio.

Cummins research has indicated that.

1. A truly high speed Diesel with increased flexibility in operation is a future probability.

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INGENIOUS ORE CAR MOVER: Having trouble with underground ore car transfers? Save time and money with American Mine Door Company's new Canton Car Transfer. It enables the operator to load continually while filled cars are being transferred to the rear of the train, it requires two men only two minutes to spot it anyplace on the track where side room permits, and it will hold cars up to 6 tons. Get the new descriptive folder on this money maker by circling no. 2.

CUT REPAIR COSTS: Resisto-Loy can save you repair costs by rebuilding worn crusher mantle liners with easily-applied Magnatone. Surfaces up to one and one half inches thick are not uncommon and service tests indicate that the rebuilt surfaces outlast the original liners by as much as one third. Circle no. 3.

NEW CONVEYOR BELTING: Goodyear belts using fabric carcasses of Du Pont's new high-strength Cordura rayon have been found to train better than former belting materials due to the reduced overall thickness of the finished belt made possible by fabric layers of greater strength. Get Du Pont's new Cordura booklet, "Sinews for Industry," by circling no. 4.

REDUCE SURFACE HAULS: Many remote mines that have electric power are finding that by using Pittsburgh Lectromelt smelting furnaces, in sizes from 50 to 50,000 kva, the cost of transporting bulky ores and concentrates is eliminated. Let Lectromelt help you. Get their new bulletin 104, describing their furnaces and services by circling no. 5.

SO_2 FROM SULFIDES: The Dorr Company's Fluosolids system has proved to be an economical process for supplementing short sulfur supplies in the production of sulfuric acid and SO_2. Dorrco literature explains the economy, simplicity and ease of operation of this distinct departure from conventional sulfide roasters. Circle no. 6.

EXACT BTU ANALYZER: Industries throughout the world are finding that Sturtevant's automatic coal sampler will increase boiler efficiency and cut operating costs by accurately and rapidly sampling bulk coal for precise BTU values. Get Sturtevant's booklet, "How to Sample Coal Automatically," by circling no. 7.

DIESEL INSTRUCTION: Because of expanding worldwide use of Diesel power, Cummins Diesel Export Corporation now offers free engineering assistance to power users and has made available operating instructions in English, French, Spanish, and Portuguese. For full information, circle no. 8.

SURFACE BLAST HOLE DRILLS: The Salem Tool Company has published descriptive literature on the rugged and efficient McCarthy drill. Introduction of this hydraulically controlled, self-propelled drill, produced in models for both vertical and horizontal drilling, has increased production by as much as 40%. Circle no. 9.

UNIQUE SNATCH BLOCKS: For handy operation in tight places, the snatch blocks made by Gold Foundry and Machine Works are hard to beat. They're designed to be opened and threaded with a bight of rope and are built so that accidental opening during operation is impossible. For complete specifications on these roller-bearing snatch blocks, circle no. 10.

THREE-PRODUCT HMS: The Akins separator is the heart of Colorado Iron Works' new HMS unit that produces concentrate, middling, and tailing in a single-stage operation. Get bulletin 49 describing the new unit by circling no. 11.

PILOT SMELTING SERVICE: The Mace Company will make working scale tests on your ore in lots of one ton or more to determine how much you can save in transportation and treatment charges with their furnaces and sintering hearths. Preliminary reports will be made on the receipt of ore analyses. Their new catalog is now available for further details. Circle no. 12.

INSIDE A ROD MILL: Ever wonder what goes on inside a rod mill? Hardinge's bulletin 25-C-3 contains a complete discussion of the theory and proper application of rod mills. Circle no. 13.

STOPER SAVES CARBIDE BITS: Chicago Pneumatic's CP-34 stoper assures long service from expensive tungsten-carbide bits by combining the right piston and rotating speed, stinger pressure, and hammer blow. The drill features graduated control of feed-leg and an instantaneous pressure release. For complete information, circle no. 14.

URANIUM ANALYZER: Minerals Engineering Company has produced a new portable counter that, with proper procedures, will give the U_3O_8 content of ores accurate to within 0.02%. The device combines accurate analyzing with portability and high sensitivity for field prospecting. Circle no. 15.

DUST AND FUME CONTROL: The rugged, efficient centrifugal, hydraulic and bag type collecting equipment produced by the Northern Blower Company is the result of 30 years of service to the smelting and milling industries. For more information on the outstanding record of high recovery and low cost made by Norblo systems, circle no. 16.

SELF-ALIGNING BELT IDLERS: Jeffrey's catalog 785 describes their complete line of self-aligning and troughing-type belt idlers as well as a pivoted-type return idler used for both troughing and flat belt conveyors. To learn how Jeffrey belt conveyors can cut your handling costs, circle no. 17.

MINE-HOIST DRIVES: General Electric, a company with experience covering over 900 hoist-drives now in use, has published bulletin GET-1430 that covers problems connected with mine hoists under the title, "Electric Equipment for Mine Hoists." For a copy, circle no. 18.

TIMBER PRESERVATIVES: Osmosalts and Osmoplastic are preservatives that will increase the life of mine timbers from 3 to 5 times. To get Osmose Wood Preserving Company's book, "Force Down Your Operating Costs," that describes Osmose treatment, circle no. 19.

CONVEYOR SYSTEMS: Hewitt-Robins, the only manufacturer offering a complete mine conveyor—machinery, belt, motor, reducer, and drive—has made available the detailed specifications on their many conveyors. Circle no. 20.

STRONGER WIRE ROPE: Hercules flattened strand wire rope offers the greatest

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strength and durability in any given size of rope since its unique design packs more steel per inch of diameter than any conventional rope and allows sheave contact by four external strands rather than one, as in most ropes. For more details, get Leschen's "Wire Rope Handbook." Circle no. 21.

TRAMP IRON REMOVAL: Stearns suspended magnets are designed to protect expensive crushers, grinders, pulverizers and other vital equipment by completely removing tramp iron from mill circuits. Stearns also has available all necessary laboratory and testing facilities for separation tests on your materials. For further information and their descriptive literature on magnets, circle no. 22.

LIGHT-DRILL FEEDLEG: The increased size of the new Consolidated Pneumatic feed-leg for light rock drills overcomes all tendency to whip, gives greater rigidity, and prevents breakages in any drilling position. A simplified throttle and a new mounting bracket that insures alignment make this the ideal one-man rig. Circle no. 23.

LOW COST MATERIALS HANDLING: Pioneer Continuflo equipment is successfully extending the lives of many old mines on both the Mesabi and Cayuna ranges in Minnesota by profitably handling low grade ores. For further information on the line of feeders, screens, crushers, and conveyors produced by the Pioneer Engineering Works, circle no. 30 on the PEP card.

CENTRIFUGAL PUMPS: A new bulletin describing the function, sizes and capacities of their centrifugal pumps has just been issued by the Morris Machine Works. To obtain a copy of this handy, pocket-size reference, circle no. 31.

CONVEYOR CARRIER CATALOG: The Stephens-Adamson Manufacturing Company has published a new catalog on their belt conveyor carriers. Complete design and engineering data are included. Circle no. 34

SAND PUMPS: For complete literature on a line of sand pumps specifically designed for pumping sands and slurries in mines, mills, and smelters, write to Allen Sherman-Hoff Co., 223 S. 15th St., Philadelphia 2, Pa., or circle no. 36 on the PEP card.

CONTINUOUS GRINDING: A new 28-page catalog in which Patterson ball, tube and rod mills are detailed, has been published by the Patterson Foundry and Machine Company. Available with a variety of grinding media, these mills are adaptable to wet or dry grinding, open or closed circuit grinding, and grinding as fine as 10 microns or as coarse as 4 mesh. Included in the catalog are over 50 illustrations with complete technical descriptions. Circle no. 47.

CENTRICLONE: A new classifier with operating characteristics of both the conventional cyclone and centrifuge is now in production by Equipment Engineers. Called the Centriclone Classifier, it gives a new character of sizing by allowing sharper cuts to be made than previously were considered possible in mineral dressing. For more complete data, circle no. 73.

PNEUMATIC TOOLS: The Newage International, Inc., describes its complete line of famous Desoutter portable pneumatic tools and accessories featuring new and patented features in a catalog recently released. For a copy, circle no. 50.

ANTI-RUST PAINT: A new bulletin describing anti-rust paint has been announced by the Monroe Company, Inc. Rust-Cure can be applied on rusted surfaces without wire-brushing, scraping or sandblasting and will seal rusted surfaces and retard further rusting action. Available in black, aluminum and clear, it can be applied by brush, dip or spray methods, indoors or out. For a copy of this booklet, circle no. 52.

GENERAL PURPOSE PUMPS: Construction details on Allis-Chalmers' grease-lubricated, pedestal-mounted, general purpose pumps (Type SSB) are given in a new bulletin. The pumps, available in capacities to 2,500 gallons per minute at heads to 550 feet, can be had in a choice of materials that will handle almost any liquid at temperatures to 250°. Circle no. 53.

JET PUMPS: The Penberthy Injector Company has released a new catalog covering a complete line of jet pumps that use steam, air, or water as the motive fluid; have no moving parts or packing glands; require no foundations; are small in size and practically noiseless; and can pump solids in suspension. To obtain this bulletin, circle no. 54.

DUST RECORDER: A description of the new General Power Plant Corporation's gas dust analyzer with a Brown Electronik Potentiometer, as well as operation and application data, is included in a bulletin published by the Minneapolis-Honeywell Regulator Company. For a copy, circle no. 55.

NEW CONVEYOR BELT: The Raybestos-Manhattan, Inc., has announced literature on their new "F" conveyor belt that is engineered for application where there is danger of tearing or puncture, where small pulleys are used, where more flexibility is required, and where thick, narrow belts are required. Circle no. 56.

TRUCK PARTS: If you are operating outside the continental limits of the United States and are looking for parts and units, either new or rebuilt, for any or all makes of civilian and surplus military trucks and vehicles, air mail your specific needs to the Mutual Truck Parts Company, Inc., 2000 South Wabash Avenue, Chicago 16, Illinois. For more information on the vast supply of parts carried by Mutual, circle no. 57.

MINE PHONES: Explosion-proof sound powered telephones are available from the United States Instrument Corporation. To obtain a catalog that describes both surface and underground applications of sound powered equipment, circle no. 58.

PLANT HEATER: A 140,000 B.T.U. heat machine for indoor or outdoor use is being produced by Fageol Heat Machine Company. The machine employs an entirely new principle of forced-air circulation. By blowing warm air out of the machine's base along the floor, it creates a 6-foot-high heat blanket in areas up to 3,000 square feet of confined space or 1,600 square feet of open space. Circle no. 61.

HYDRAULIC JACKS: Complete information, including specifications and application data, on hydraulic jacks, pullers, and attachments, is offered in a bulletin issued by Templeton, Kenly and Company. Circle no. 63.

JET-PIERCING: Detailed information on the fundamentals and practice of jet-piercing, the revolutionary new aid to more rapid surface mining, is available in a booklet published by Linde Air Products Company. For your copy, circle no. 68.

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displacement with engine size and weight reduced for given power outputs.

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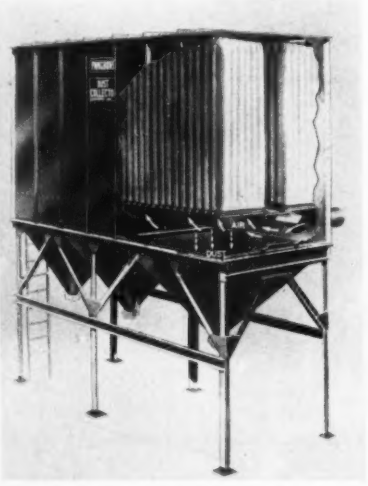
Copies of the full report can be obtained by circling no. 76.

Cloth-Bag Dust Collector Installed at Low Cost

A new cloth-bag collector for metal oxides has been designed by the Pangborn Corporation. The simplified design of both the bags and the required mech-



anisms have enabled the manufacturer to offer collectors in a wide range of sizes. Easy accessibility and a minimum numbers of parts provided for maintenance and inspection easily and without tools.

If industrial dusts of any kind are causing problems in your plants or if dust analyses prove that recoverable values are being lost, Pangborn equipment will save you money with minimum installation and maintenance costs. Circle no. 59.

Slide-Rule Calculator Computes Diesel Savings

Fuel savings of Diesels over gasoline engines can be easily calculated in dollars on a cost comparator prepared by Cummins Engine Company.

This handy slide-rule type calculator will allow the power user to quickly determine the yearly savings that can be

realized through the use of Cummins Diesels for all types of applications. The cost comparator is based on fuel savings experienced by operators during the 33 years Cummins Diesels have been used for heavy-duty jobs.

For the truck owner one scale is on a mileage basis. Diesel fuel-gasoline price differential, as well as the increased miles per gallon gained by Diesels are considered.

The reverse side of the slide-rule shows savings on an hourly basis for industrial and marine power users.

Engine operators who are interested in obtaining a Cummins Cost Comparator may do so by circling no. 26.

Long Hole Drilling Tools For Depths To 150 Feet

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factured by the Rock Bit Sales and Service Company have been proven successful by over a year's constant field operation.

Not only are the couplings and adapters self-cleaning and self-cooling, but the overall design insures hole alignment and eliminates vibration with proper drilling procedures. The sectional steel can also be made by the user for use with the equipment. For a descriptive bulletin, circle no. 67.

New Payloader Has 1-Yard Bucket and 4-Wheel Drive

The outstanding feature of the rugged new Payloader is the remarkable traction and flotation afforded by four large inter-

changeable driving tires for work in sand, mud and snow.

Rear-wheel steering makes the unit a maneuverable and easily operated bulk handling machine. Available with either diesel or gasoline prime mover, the model HR has fingertip hydraulic controls and features four speeds in both directions for high-speed shuttle operations. For further details and literature on the new Payloader model, circle no. 71.

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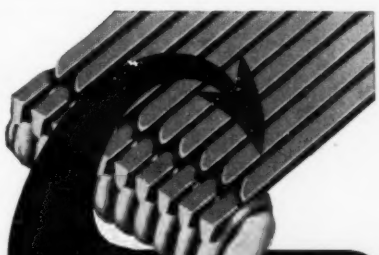

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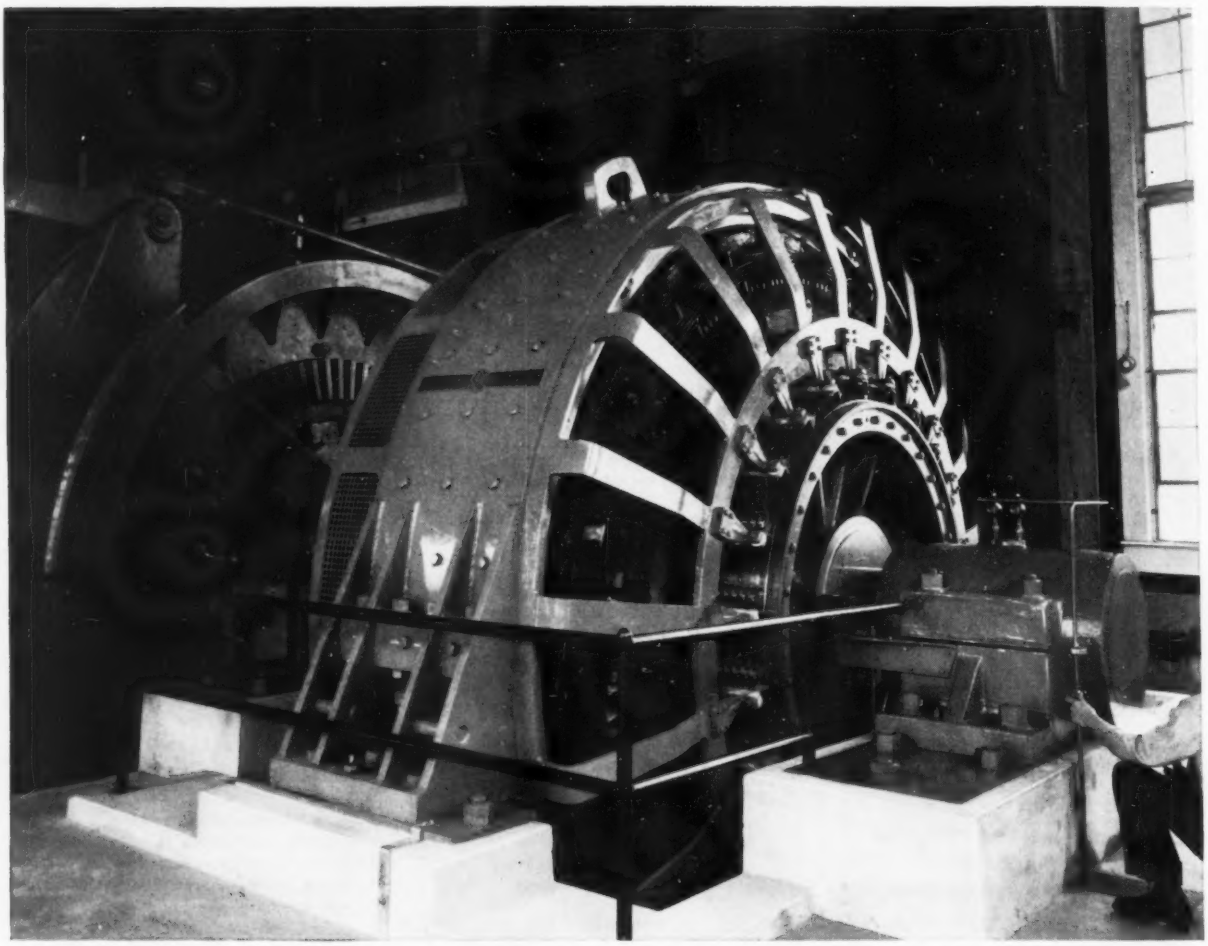
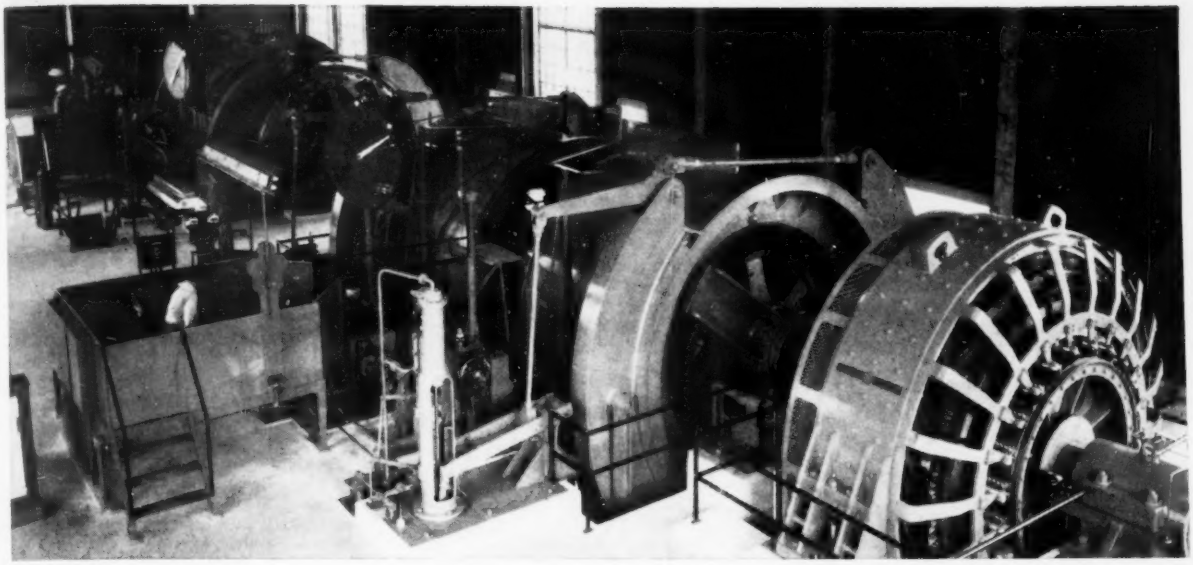


Here it is installed—the G-E 3000-hp 600-volt 60-rpm d-c motor that will drive Anaconda's Kelley Shaft ore hoist. Scheduled to go into production in 1952, it will permit handling much larger tonnages than possible now. Skips, carrying 12 tons of ore per trip, will have a capacity of 853 tons per hour from 868 feet, with approximate power consumption of only 12.4 kwh per trip. From a 4335 foot depth, capacity will be 307 tons per hour, using about 57.3 kwh per trip. New hoist is expected to be able to handle approximately 10,000 tons of low-grade ore per day.

GENERAL ELECTRIC

660-21

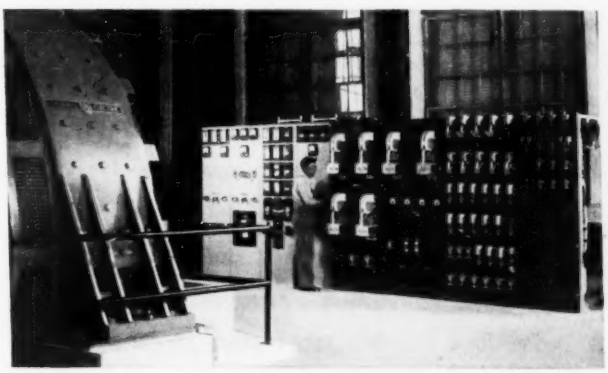


This over-all view shows the G-E 3000-hp motor direct-connected to the hoist's two drums, with the hoist operator at his control station. Expected capacity of the new hoist is 10,000 tons per day, supplemented by the 5000-tons-per-day capacity of the other hoist shown in background.

Complete G-E hoist-drive equipment for Kelley Shaft in Greater Butte Project includes 3000-hp d-c motor, permits lifting 12 tons of ore per trip at low kwh cost

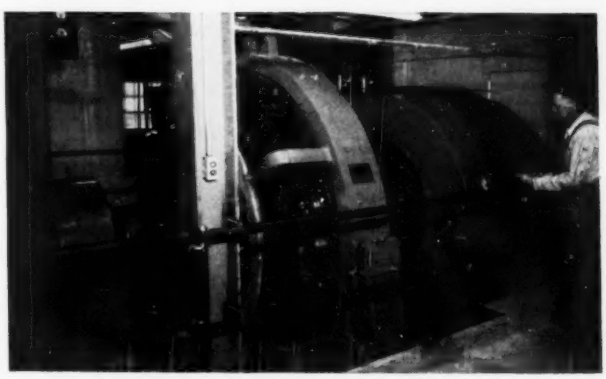
High-tonnage low-cost hoisting is a "must" with Anaconda. Especially so on its Greater Butte Project for the long-range economical mining of an anticipated 130,000,000 tons of low-grade ore by block caving. That's why Anaconda, a satisfied customer since 1913, asked General Electric to supply the main ore-hoist drive in its Kelley shaft —including one of the largest single mine-hoist motors in the world!

General Electric's extensive experience covers over 900 large hoist-drive installations now serving the country's mines, helps explain why companies like Anaconda keep coming back for more of the same. When *you* call in a G-E mining-industry specialist, you put this experience to work for you —profitably. Meanwhile, send for Bulletin GET-1430, "Electric Equipment for Mine Hoists." *General Electric Company, Schenectady 5, N. Y.*



Control for the huge G-E motor is centered in this panel, built throughout to meet specifications laid down by Anaconda. Designed for either manual or automatic hoisting, the drive will operate two skips in balance, at a speed of 2250 feet—almost half a mile—per minute.

New G-E Motor Selection and Application Course can help train your mine and mill workers, increase their efficiency. A G-E "More Power to America" program, it shows how motors work, types in use, and how to select and apply them. Write now for Bulletin GEA-4938-16 describing the course in detail.



In addition to hoist motor and control panel, the G-E drive equipment includes this motor-generator set to supply the needed d-c power. It comprises a 2500-kw 600-volt d-c generator driven by a 3500-hp 514-rpm 2400-volt synchronous motor, and a 60-kw exciter.

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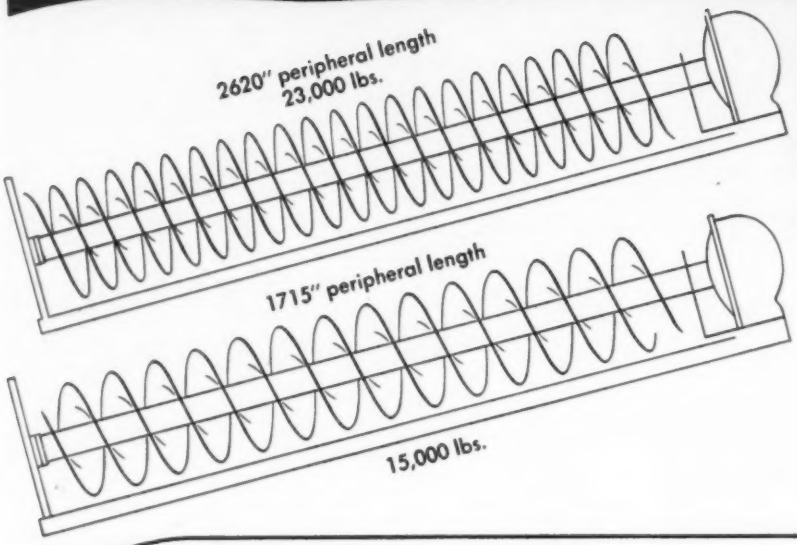

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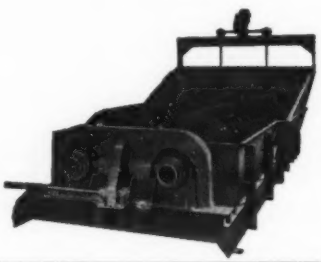

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*A report of a technical investigation on the comparison of spiral capacities at different pitches is available. Ask for Technical Investigation No. 51.

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More Fluorspar to Kaiser From New Mine and Mill

A new mill to process fluorspar—the first in the state of Nevada—will be built by Kaiser Aluminum & Chemical Corporation. Fluorspar will come from the Baxter mine which Kaiser recently purchased from H. W. Gould & Co. The mill will also have sufficient capacity to handle ore purchased from other Nevada deposits.

The Baxter mine consists of some 10 claims about 19 miles north of Gabbs, Nevada. Gould had been developing the property since it acquired it in 1950. It will be further developed by deepening existing shafts which are now at the 400-foot level. A $7,000,000 purchase contract to supply acid grade concentrate for the government's stockpile will be cancelled. Gould is continuing its extensive exploration program for fluorspar properties.

Construction of the mill will begin in the near future upon selection of a site in an area accessible to rail and highway transportation. Operations are scheduled to start late this year.

To Search for Uranium On Acoma Indian Property

Uranium prospecting on 223,000 acres of the Acoma Indian Reservation has been approved in an agreement signed between the Acoma Indian Tribal Council and F. A. Sitton of Dove Creek, Colorado. Mr. Sitton would have a preferential right to lease if uranium is found in sufficient quantities to merit mining operations, after approval by the United States Commissioner of Indian Affairs. The Acoma reservation is about 70 miles west of Albuquerque, New Mexico.

The agreement is similar to one reached between the Anaconda Copper Mining Company and the Laguna Indians nearby. The Anaconda-Laguna agreement was followed by an announcement that a uranium plant would be built at Grants, apparently to serve uranium fields in a wide area of New Mexico.

Mr. Sitton has an interest in the proposed processing plant scheduled for erection near Shiprock, New Mexico. He is also carrying on large-scale mining and exploration at his other uranium claims in the Grants area. Four bulldozers and one wagon drill are used for building roads and stripping overburden. More than 2,000 tons of ore have been mined to date and stockpiled at the mines.

Iron Mining Reaches New High in New Mexico

Iron mining in New Mexico has reached its highest point this year over the past 15 years. Three miners are said to be chiefly responsible for this, as they prepare to ship 60,000 tons of iron ore between them to the expanded operations of the Colorado Fuel & Iron Corporation at Pueblo, Colorado. If the ore turns out to be suitable enough for CF&I's purposes, increasing tonnages of New Mexico's deposits can be developed.

The miners are Robert Robins, who began shipping from the Central mining district near Silver City, early in February; J. D. Close, who also began shipping recently from a development seven miles south of Carrizozo in Lincoln county; and Frank S. Hall, who has moved equipment to a site 20 miles south of Corona in Lincoln county to begin work. It is expected that the 60,000 tons will be shipped within about six months.

New Mexico's iron ore reserves were recently estimated at 72,000,000 long tons of ore with iron content of about 35 percent or better, and 70,000,000 long tons of ore with less iron content.

The *Coronado Copper and Zinc Company*, Dragoon, Arizona, is deepening the Moore shaft from the 500-foot level to the 700-foot level. In addition, the company has let a contract to Alfred Harris of Willcox for nine new frame houses for employes. The Coronado property is opened by two shafts—the Moore, and the old Republic, a 1,600-foot shaft. At present, the company is employing close to 150 men and production is approximately 6,000 tons of copper-zinc ore monthly. The Moore shaft was sunk about 3½ years ago, then deepened 200 feet when the mine was reopened in June 1950, the job being handled by Carl Elayer contractor. Coronado Copper has its own milling plant and ships its copper concentrates to the International smelter at Miami, Arizona, and the zinc concentrates to Bartlesville, Oklahoma. Fred E. Gray is manager of Coronado.

Apache Asbestos Mines, Inc. of Globe, Arizona, is shipping about 30 tons of asbestos ore monthly from its holdings on the White River Indian Reservation. Production is from room and pillar stopes. H. F. Brewer is superintendent.

The *Shattuck Denn Mining Corporation* is continuing its exploration work at the *Kay* copper mine, located in the Tip Top mining district about 50 miles north of Phoenix, Arizona. At present, 19 men, on a three-shift basis, are employed in the work; crosscutting on the 1,200 level and diamond drilling are in progress. F. W.

TIP TOP TO PRODUCE TUNGSTEN

This is an aerial view of the switchback road to the Tip Top tungsten mine, constructed by Blue Ridge Midway Gold Mines Company, Ltd., in the Sierra Nevada Mountains north of Bishop, California. Blue Ridge acquired the property in May 1951 and another nearby tungsten property, Hilton Creek, a month later. As soon as spring thaws clear the roads of snow, development and production will get under way. Shipments will be made to the United States Vanadium Company's mill at Pine Creek. Blue Ridge also owns the Sugar Hill and Big Blue mines at Callahan, and the Pilot mine at Downieville, California. Gerald B. Hartley is president of Blue Ridge.

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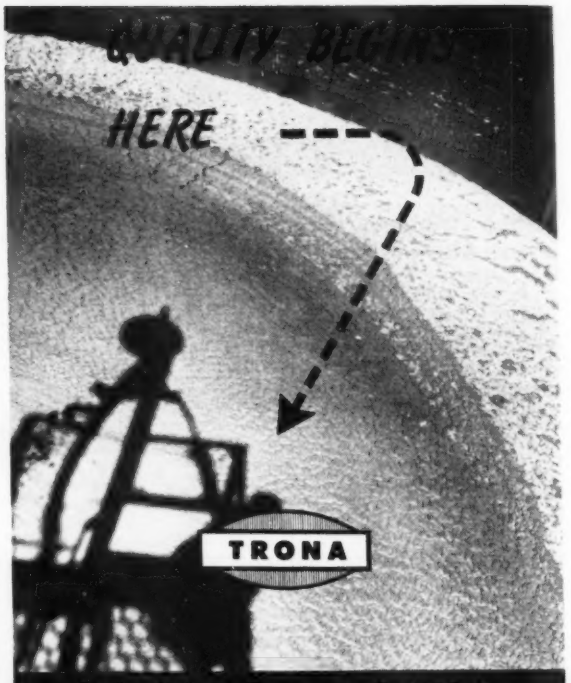

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Garrett of Humboldt is mine superintendent. H. F. Mills, general manager of the corporation's *Iron King* division, is supervising the work. The main shaft of the Iron King mine at Humboldt is being deepened to the 2,000-foot level. The company currently is producing at the rate of 17,000 tons of ore monthly, and is employing a mine crew of 190 men. The Iron King was the state's leading producer of zinc in 1951, and ranked second in the production of lead.

About 400 tons of fluorspar ore are being shipped monthly from the *Lone Star* mine at Benson, Arizona. A crew of 10 men are stoping from the 250-foot level. The Lone Star is now owned and operated by the Mid-Continent Mining Company. Wiley Cochran of Elizabethtown, Illinois, is manager; C. L. Flynn of Tucson, Arizona, is agent-in-charge; and Lloyd Boulden is superintendent at the mine.

The *Pima Mining Company* of Tucson, Arizona, has started underground exploration work at a new copper deposit, in the Mineral Hill mining district, located about a mile east of the *San Xavier* mine of *Eagle-Picher Company*. The contract for the 450-foot, two-compartment shaft was let to the *Centennial Development Company, Inc.*, of Eureka, Utah. A steel headframe and necessary surface facilities have been erected and actual sinking started. Geophysical work and diamond drilling preceded the decision to sink the exploration shaft. E. D. Spaulding of Tucson is in charge for the Pima Mining Company. Harold B. Spencer is president of Centennial organization.

J. B. Williamson and associates of Globe, Arizona, are leasing the *Ben Hur* claims in the Aravaipa district, near Klondyke, Arizona. During December they shipped four cars of lead-zinc ore.

Exploration work is continuing at the *Rebel* mine, a group of two claims in the Big Bug district, six miles southwest of Humboldt, Arizona. The old shaft is being cleaned out and retimbered, and a gas hoist and compressor have been installed. Metal values are in lead, zinc, gold and silver. The Rebel is owned by Frank L. Main, of Prescott.

John P. Giacoma, Tombstone, Arizona, has shipped three cars of manganese ore from the *Promptor* mine to the government's purchasing depot at Deming, New Mexico. The ore was said to run from 30 to 40 percent manganese. According to Giacoma, he expects to be making regular shipments of two cars weekly very shortly.

William Ward of Tombstone, Arizona, and associates are planning immediate operation of the old *Pejon* mine at Gleeson. They recently acquired the property from Steve Pryor of Gleeson under a lease with option and royalty agreement. The Pejon was first operated in 1885 and is said to have produced a considerable tonnage of copper and lead ore, but was abandoned around the turn of the century. It was developed by an 800-foot tunnel and several drifts.

Intermittent shipments of copper ore are being made from the *Southern Cross* mine in the Helvetia mining district of Pima county. In recent work, the shaft has been sunk 60 feet on a 45-degree incline to the east, with a 15-foot drift north from the bottom of the shaft. Both the shaft and the drift are in the ore fissure and further drifting, both north and south from the bottom of the shaft, are proposed; the ore above the drift is to be stoped. Present operators are Richard Chilson and Lauren Van Horn, both of Tucson, who are leasing from the Lewisohn Estate.

A gold ledge recently discovered in the *Red Star* mine in the Alleghany district of California may be an extension of the famous Sixteen-to-One vein system. The Red Star is owned by *Tightner Mines Company* and operated by the *Yellow Jacket Consolidated Gold Mines Ltd.* of Bakersfield, California. The vein is being developed on the 500- and 600-foot levels, with levels of the 600-foot winze recently completed.

New placer claims are reported to have been staked in the area south of Inyokern, California. Ora L. Hopkins, Chester D. Smith, and Fred W. Bower located the *Agua Buena* claim which covers 160 acres; J. E. Morhardt, Lee Early, and Phillip Partridge of Bishop, California have sunk a 42-foot discovery shaft on a new claim named the *Adventure Placer No. 1*, and have laid out 13 additional claims; and Leonard LaRosa, Jr. is reported to have located a 20-acre claim in the Terese mining district.

California's gold output during 1951 has been tentatively estimated at 340,567 ounces, valued at $14,373,100. Contributinues a decline which started in 1947. The state's 1950 production was 410,660

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ounces, valued at $14,373,100. Contributing factors are the closing down of several dredges, depletion of some gravel deposits, and the fixed price of gold which it is said is an "almost insurmountable economic barrier" to expansion of mother lode mines. Silver production in 1951 was reported at 1,112,288 ounces, values at $1,006,677, slightly over 1950. Copper production totaled 830 tons, valued at $403,380; lead, 13,700 tons, valued at $4,685,400; and zinc, 9,060 tons valued at $3,243,480. Copper and zinc production were higher than in 1950 but lead was lower.

The *Tungstar-Hanging Valley Mining Company* has received a $75,000 Reconstruction Finance Corporation loan under authorization of the Defense Production Act. Funds will be used to mine tungsten, buy additional equipment, and for working capital. The company has headquarters in Bishop, California and operates the *Tungstar* mine above Pine Creek, west of Bishop. The mine is developed through an adit, and 30 tons per day of ore is mined in shrinkage stopes and transferred by aerial tram to the 75-ton-per-day gravity-flotation mill on Pine Creek. Ira L. Thomason is general manager.

R. B. Lyttle of Los Angeles has received authorization for a DMEA exploration loan to develop his *Blew Jordam* zinc property in San Bernardino county, California. The original terms of the loan called for completion between January 1 and April 1, 1952. A modification of the terms has been sought due to the inability to work the property during the winter months.

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NEVADA

A 200-ton tungsten mill has started operations at Sodaville, Nevada, three miles south of Mina, under the management of the *Nevada Tungsten Corporation*. The plant, which was recently enlarged and redesigned, will handle tungsten ores produced by company operations and will also treat custom ores. John Sinkey is president of the company.

Contractors are at work sinking the Deep Ruth shaft of the *Kennecott Copper Corporation* in Neveda. The shaft will go down 1,500 feet before drifting will be started to locate and block out the ore bodies. Production is expected to begin about January 1, 1954. Capacity of the company's mill will eventually be stepped up from 19,000 tons daily to 21,000 tons to handle the increased production from the Ruth open pit and the Deep Ruth. A new 20,000-kw generator will furnish additional power.

Bruhi Enterprises is mining lead-silver-zinc ore at Silver Peak, Esmerelda county, Nevada. The mining organization is a partnership with E. R. Hines of Reno and Avery Brundage of Chicago.

Daily shipments of 1,000 tons of high grade iron ore are reported to be the goal of the *American Ore Corporation* operating in Pershing county, Nevada, when essential equipment is installed. A few carloads are now going to Indiana Harbor, Indiana, for use of the *Youngstown Sheet and Tube Company*. American Ore has purchased about 30 claims south of Buena Vista Valley on the east side of the Humboldt Range and outright purchase plans are now being consummated. The future shipments are scheduled for Detroit and Chicago steel mills.

NEW MEXICO

New interest is being shown in mining claims in the White Signal mining district 25 miles south of Silver City, New Mexico, which are reportedly radioactive, containing traces of uranium. The area was explored by U. S. Bureau of Mines representatives during World War II and it was recommended then that further examination and exploration be made. Financial interests in New York and Los Angeles are now said to be interested in the claims held by E. B. Killion of Silver City, and Mr. and Mrs. A. A. Leach of Lordsburg. A year ago the Leaches filed suit against Grant county because a highway survey had cut through their claims. They reported that uranium-bearing ore had been used to make a fill. The material was valued by them at $1,000,000.

The *Shingle Canyon Mining Company* is reported to be selling its Mimbres mining district property in Grant county, New Mexico, to the *United States Smelting, Refining and Mining Company*.

State Mine Inspector John A. Garcia, at a meeting in Albuquerque, New Mexico, said that new potash production, plus development work being carried on by many large mines in the state, will push the value of New Mexico's mineral production to $200,000,000 in two years. In the fiscal year that ended June 30, mineral production in the state was valued at $92,490,895.

The manager of Albuquerque's Better Business Bureau, Harry Luttbeg, has proposed that the New Mexico mining industry work jointly with the bureau to bring factual information to the investing public. He called for a committee of members from the New Mexico Mining Association to advise the bureau on mining investments and to aid in organizing an education program.

The *Peteca Minerals Corporation* of New Mexico has contracted with the *De Anza Engineering Company* of San Francisco to build and equip a large mica processing plant at the mouth of the Abrevadero Canyon in Rio Arriba county, two miles south of Peteca, New Mexico, and seven miles north of La Madera. The company has also made arrangements with the Kit Carson Electric Cooperative to supply 225 kva of electric power at 440 volts for the mill and other Peteca operations. Joseph Thompson is president and Ross Martinez is vice president. The new mill is expected to operate on a three-shift basis.

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Climax Extends Storke Level Development Work

Climax Molybdenum Company at Climax, Colorado, has awarded an increase in the size of the Storke level mine development contract to Gibbons and Reed Company and the Boyles Brothers Drilling Company of Salt Lake City, Utah. This work is in addition to the original Gibbons and Reed contract which extends until November 1, 1952.

Despite a severer-than-normal winter at Climax, construction of the new crushing plant at Storke level portal and mill construction adjoining the present mill have continued without interruption. The two new installations will bring the capacity to 20,000 tons per day. Franklin Coolbaugh is general superintendent for Climax's molybdenum operations.

South Dakota Gets New AEC Field Office

The United States Atomic Energy Commission's Raw Materials Division has opened a new field office in Hot Springs, South Dakota. Geologists and engineers will be stationed at the office to make field examinations of uranium occurrences in the Black Hills area. H. S. Stafford will be chief geologist and will be assisted by geologists Thomas Pifer and Richard Olson.

The geologists will first make a detailed study of carnotite occurrences in the Craven, Red, and Coal Canyon area about eight miles north of Edgemont. Unlike the Colorado Plateau area, the uranium has been found in the Lakota sandstone. At least three stratigraphic zones have been found to carry uranium. Each is about three-feet thick with individual carnotite seams up to one inch in thickness.

Indian Reservation Open For Full-Scale Mining

The Navajo Indian Reservation in Utah, Colorado, Arizona, and New Mexico has been opened to full-scale uranium mining and prospecting, according to Norman Littell, attorney for the Navajos. Under the terms of the new regulations, the Navajos will be permitted to lease their mining permit areas to non-Indian mine operators.

As a further aid to uranium mining, the United States Atomic Energy Commission has certified mine access roads in Utah, Colorado, Arizona, and New Mexico as essential to the national defense. Cost of building 24 access roads is estimated at $4,730,000 and certificates are being sought for an additional thirteen roads estimated to cost about $415,000.

First of the projects include grading and gravel surfacing of 35 miles of road from seven miles south of Shiprock, New Mexico, to Cove, Arizona. The other calls for 12 miles of new road from Red Rock, Arizona, to a point south of Belcabite, New Mexico. The roads are designed to speed up transportation of uranium-bearing ores from remote mining regions to the new ore-buying station at Shiprock, New Mexico.

Development of the 200-foot level of the *Bachelor* mine of the *Bachelor Development Company* north of Ouray, Ouray county, Colorado, has been completed, according to manager Julius Sonza. Mine crews are now busy extending the 300-foot level to prospect for mineralization found on the 200-foot level.

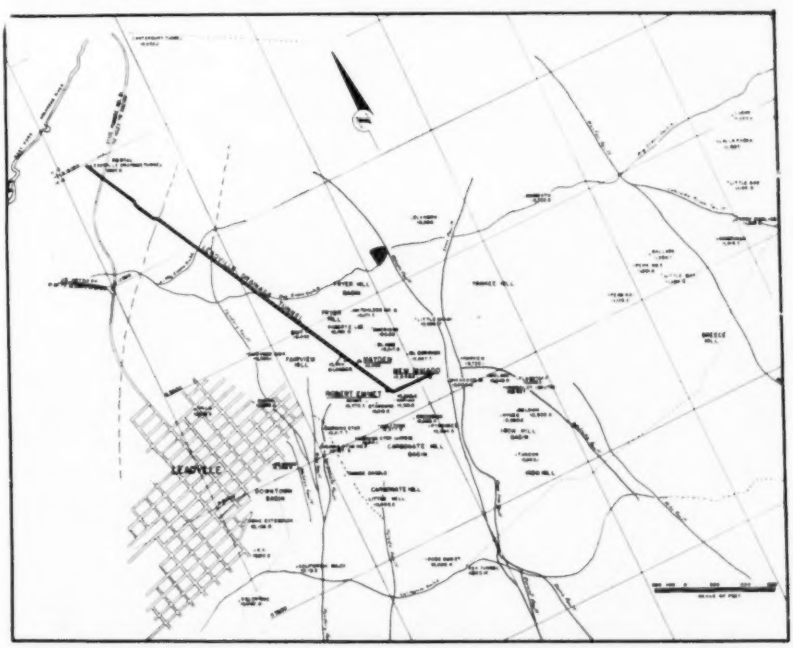
The *Idarado Mining Company* has mined about 5,000 tons of base metal ore (lead-zinc-copper) with low gold and silver content from the Ajax vein through the Meldrum Tunnel above Pandora, San Miguel county, Colorado. The ore was mined from the Ajax vein northwest and southeast of the Tunnel. It was milled on an experimental basis at the Pandora mill of *Telluride Mines, Inc.* William Nelson of Telluride directs the Meldrum and Bobtail operations of Idarado.

Mill construction and underground development is continuing at the North Gate, Jackson county, Colorado, fluorspar property of the *Ozark-Mahoning Company*. Robert Wico, manager of western mines for Ozark, has been at the mine since early February to supervise operations. Initial production of acid-grade fluorspar from the new 250-ton-per-day flotation mill is scheduled for early summer.

William Cornett, Harry Bennett, and Lawrence Ross are operating a vanadium (roscoelite) mine on Bear Creek near Vanadium, San Miguel county, Colorado.

The *Montana Mining & Development Company* has started milling ore from its *Lamartine* mine in Clear Creek county, Colorado. The company has carried on an extensive development program for the last year and has developed lead-zinc-gold-silver ore by drifting. George H. Anderson of Idaho Springs is superintendent.

The *South Platte Dredging Company* has closed its connected bucket line gold dredge near Fairplay, Park county, Colorado. Closure was forced on the company by the rapidly mounting costs of opera-



COMPLETE LEADVILLE DRAINAGE TUNNEL

Driving of the Leadville drainage tunnel, whose course is indicated by the heavy black line on the accompanying map, has been completed in Colorado's Lake county, by the U.S. Bureau of Mines. Well over two miles of tunnel and laterals, much of it driven through wet, heavily fractured, and almost impenetrable ground, were already finished when the final round was blasted to penetrate the Mikado fault. The tunnel had previously been connected to the New Mikado shaft. The current contract with the Utah Construction Company of Salt Lake City has been terminated. Bureau of Mines personnel are finishing clean-up work. Cost of the entire project will total about $2,000,000. Under an agreement with property owners, royalties will be collected on minerals made accessible, produced, and sold as a direct result of the drainage project.

tion with a fixed price for the gold recovered. The dredge was the sole bucket-line dredge to resume operations in Colorado following the end of World War II. The dredge is being maintained on a minimum cost stand-by basis. James Freeman, dredge master, has been transferred to Battle Mountain, Nevada, where he is working for the *Natomas Company* at its connected bucket-lined dredge.

Newmont Exploration, Ltd. is conducting an extensive exploration program near the *Vulcan* mine south west of Gunnison Colorado. Surface diamond drilling on a three-shift-per-day basis, seven days a week, is under the supervision of John Green. Some of the holes are reportedly 800-feet deep and show mineralization.

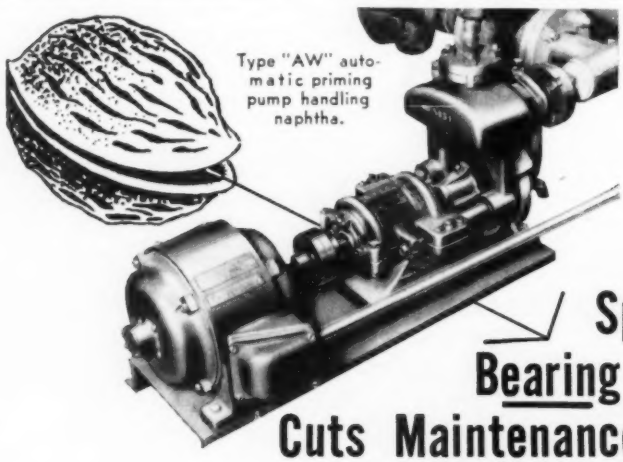
The *Dulaney Mining Company* is installing a uranium-vanadium ore sampling plant near the Dolores River at the foot of Slick Rock Hill in San Miguel county, Colorado. Dulaney is one of the most important independent sources of this type of ore. Ore from the company's mines in the *Michael Bray* group and in Gypsum Valley will be sampled at the new plant before shipment to mills. L. P. Gaggini of Grand Junction is superintendent of operations.

The following mining activity has been reported in the Cripple Creek district, Teller county, Colorado. The *Globe Hill Mining Company* is planning to extend the Chicago tunnel an additional 300 feet to the north. Harry Allen of Cripple Creek will have charge of the work. The *Canyon Gold, Inc.* is shipping ore from the Rubie vein on the 10th level of its *Rubie* mine. The company is raising above the 9th level and driving a cross cut toward the Rubie vein on the 11th level. Troy Wade of Cripple Creek is Canyon Gold president and directs operations. Wassaw and Hansen operating a split check lease in the *Cresson* mine of the *Cresson Consolidated Gold Mining and Milling Company* are shipping high-grade ore from their lease between the mine's 6th and 7th levels. Also in the Cresson mine, *Trail Mines, Inc.*, lessee, is driving a drift on the Trail vein on the 14th level. The Cresson shaft is used as a base for operations but the development will be in ground leased from the *United Gold Mines Company*. James Keener of Cripple Creek is consulting engineer.

The United States Atomic Energy Commission has awarded contracts for diamond drill exploration in the Bull Canyon area of Montrose and San Miguel counties, Colorado, and the Polar Mesa area in Grand county, Utah. All drilling is to be done from the surface with the minimum footage at Bull Canyon, 60,000, and the maximum, 100,000. The minimum footage at Polar Mesa is to be 30,000 and the maximum, 50,000.

The *ColoTex Mining and Engineering Company* is building a bentonite processing plant at Las Animas, Bent county, Colorado, according to the firm's vice president, John D. Coates. The company controls extensive bentonite deposits in the county but little production has been made to date. The new plant will process the bentonite for oil-well drilling mud use.

M. & S. Inc. is continuing to operate its new dry-grinding feldspar plant at Salida, Chaffee county, Colorado and is operating feldspar quarries in Fremont and Chaffee counties to supply the plant. Ralph H. Magnuson of Salida is manager of the M. & S. operations.



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SOUTH DAKOTA

The *Homestake Mining Company* is stepping up ore production at its gold mine at Lead, South Dakota by raising the working week of miners by six hours to a total of 48. Employees average earnings will be increased 20 percent by the payment of time and a half for the six additional hours, according to Guy Bjorge, general manager. Shortage of miners in 1951 resulted in mine production 218,915 tons less than in 1950 and a cost increase per ton, of 11.16 percent.

UTAH

The U. S. Atomic Energy Commission is developing additional water supplies for its Monticello, Utah, uranium-vanadium plant. Two, eight-inch-diameter wells have been drilled to depths of 175 and 235 feet to develop 0.5 second feet of water.

Development of the "joint enterprise block" by *Silver King Coalition Mines Company* and *Park Utah Consolidated Mines Company* in the Park City district of Utah during 1951 showed a profit, according to James Ivers, vice president and general manager of Silver King. A total of 13,270 tons of ore were mined in the block with Silver King's share being 5,535. In Silver King ground proper, a total of 39,337 tons of ore were mined, 5,748 feet of development work done, and exploration started on three DMA projects. Net income for the year was $61,103 compared to a net loss of $81,223 in 1950.

The *New Park Mining Company* has acquired nine claims in Utah's Park City district from the *Troy Mining Company*. The claims are the *Small Hopes, Viola, Lone Pine, Vancouver, Troy, Great Hopes, Viola No. 2, Lone Pine No. 2*, and *Prince*, and adjoin New Park holdings in the district.

Construction of a new access road estimated to cost $80,000 will spend uranium-vanadium mining in the Mineral Canyon district of Grand county, Utah. Mining in the remote area between the Colorado and Grand Rivers is now underway by F. A. Sitton of Dove Creek, Colorado. The new road will extend southwest 25 miles from a point six miles north of Moab on the Moab-Thompsons state highway.

WYOMING

The *Wyoming-Gulf Sulphur Corporation* has increased production of sulphur at its open-pit mine and flotation plant near Cody, Wyoming. W. H. Marquette of Cody is corporation president and directs operations. Treating of larger tonnages and completion of a new sulphur melting plant has made production increase possible.

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RFC Loan to Idaho Firm For Mica and Beryl

A $125,000 RFC production loan has been granted Idaho Beryllium & Mica Corporation of Caldwell, Idaho, for its Muscovite mine at Deary, Idaho, according to Howard P. Sherman, mining engineer for the RFC's Spokane loan agency. About $100,000 of the sum will go for mill machinery.

It is estimated that from 300 to 500 tons of strategic beryl can be extracted from old dumps. Mica content will be ground into mica flour, for which a ready market also exists. Underground mining is planned later. H. G. Peckham of Caldwell is president of the company, incorporated in 1950.

During World War II, the Muscovite mine yielded book mica for the Metals Reserve Company, a branch of the Reconstruction Finance Corporation. Mining was under the supervision of Colonial Mica Corporation.

Seek Mineral Rights From Mullan Property Owners

The Hometown Mining Company has been organized by Clell Bentley to buy up the mineral rights of property owners in Mullan, Idaho. The town is located on ground which may contain large ore deposits of lead, silver, and zinc.

Under the new company's plan, property owners would be offered one share of stock for the mineral rights to each six and one-fourth square feet of land. The same amount would be offered to the village of Mullan for streets and other property which it holds. Because the village owns more land than any other property holder, it would be the largest stockholder in the company. The Hometown company would not itself develop the ground but would in turn dispose of the mineral rights for a consideration to another company which would develop the area.

Mr. Bentley is postmaster of Mullan and also president of the Lucky Friday Extension Company.

Day Mines and Associates Lease More Property

Day Mines, Inc. and American Smelting and Refining Company have undertaken their second exploration and development project in the silver belt of the Coeur d'Alene mining region, west of Wallace, Idaho. It is an expansion of the old Rainbow Mining and Milling Company adit 3,000 feet southerly through the Triangle, Sterling, and Fern properties. If favorable conditions are found, a shaft may be sunk for deeper exploration.

The project was revealed in a long-term lease agreement recently approved by stockholders of Sterling Mining Company. The lessees have an easement on the Rainbow adit from Coeur d'Alene Mines Corporation. They own the Triangle group adjoining Rainbow on the south, and Day Mines owns the Fern group, which is separated from the Triangle by the Sterling property. Sterling would get half of any net profits from Sterling ore after lessees' costs are recovered. Day mines has a 25 percent interest in AS&R's big sea-level Vulcan development project about a mile east of the new enterprise.

Day Mines and Federal Mining and Smelting Company, a subsidiary of AS&R, have taken a long-term lease on the Premier Star (formerly the Sunshine Premier) group of three claims in the Hunter district near Mullan, Idaho. The claims are surrounded by holdings of Federal's Morning mine property and of Independence Lead Mines which Federal and Day are developing under a similar lease agreement. Premier ground will be opened from the exploratory crosscut being driven into Independence ground from the Morning mine's 3,650-foot shaft level. The lessees will split 65 percent of any profits from ore found. R. Max Etter, Spokane, is president of Premier Star.

Operators To Reclaim Dredged Land in Idaho

Dredge operators in southern Idaho's Cascade Basin area have promised to turn their tailing piles into pasture. Answering protests from property owners and sportsmen against dredging for monazite and other strategic minerals, the operators announced they plan to level tailing mounds, plant range grass, and attempt to stop seepage of discolored waters into the north fork of Payette River. A. F. Baumhoff of Boise, president of two of the three dredging firms, said that the monazite dredging operations were the first in the United States.

Directors of the *Idaho Silver Corporations* have recommended the sale of the 19-claim property east of Mullan, Idaho in the Coeur d'Alene mining region, to *Silver Mountain Lead Mines, Inc.*, H. J. Hull, president, said stockholders will be asked to approve the deal under which Silver Mountain is seeking to consolidate seven properties for development by *Sullivan Mining Company.*

Nancy Lee Mines, Inc., has organized *New Era Mines* to take over its 84 lode mining claims, 125-ton flotation mill, and 400-ton sink-float plant in the Pine creek district of the Coeur d'Alenes. It is proposed to distribute New Era's 3,000,000 shares of 25-cent par value stock among Nancy Lee shareholders. The Nancy Lee firm said it plans to concentrate on increasing production at its Superior, Montana, property this year. It has staked 16 adjacent lode claims.

Sunshine Mining Company has completed preparations to speed driving of its deep-level south crosscut through *Metropolitan* ground and into *Coeur d'Alene Silver Giant's Lucky Boy* claims. The ventilating system has been improved and pipe raised throughout the tunnel's 3700-foot length to permit use of a larger

NATIONAL COPPER PROPERTY REOPENED

The biggest DMEA exploration project approved in Idaho in 1951—$288,000—went to Day Mines, Inc., of Wallace, to search for copper-lead-zinc ore at the old National Copper property northeast of Mullan in the Coeur d'Alene mining regic.. The photo shows the portal of the National Copper tunnel, driven about 40 years ago, shortly after Day Mines had started reopening the 4,500-foot bore. The company has now enlarged the last 500 feet of the main crosscut and is extending it.

locomotive and bigger ore cars. The company has also started driving a crosscut from its Jewell shaft to explore the west Rambo section of the *Silver Syndicate* fault-vein at the 2700-level horizon, about 600 feet above the present highest workings in this area.

Lookout Mountain Mining and Milling Company has reopened its old east workings on Pine Creek, Idaho, preparatory to down-hole diamond drilling. William Penney, Kellogg, has been reelected president.

Sun Valley Lead-Silver Mines, Inc. has purchased a new 500-cubic-foot air compressor to speed development and production at its *Blue Kitten* mine near Ketchum, Idaho, according to Ross Roundy, president and general manager. The DMPA has approved road relocations to bypass a snowslide area which temporarily halted operations in January.

Stockholders of *Silver Eagle Mining Company* will receive a dissolution dividend of 0.02291 cent a share, totaling $14,229, under a Wallace, Idaho, district court order.

Down-hole diamond drilling at the *Highland-Surprise* mine in the Pine Creek district of the Coeur d'Alene mining region has disclosed good zinc-lead ore in the Surprise ore zone at depths of 140 to 210 feet below the 1450-foot level, according to mine superintendent Robert D. O'Brien. The drilling was part of a $200,000 DMEA project. Current production is reported at 100 tons daily.

Production of silver in Idaho during 1951 totaled 14,642,231 ounces, a drop of nine percent below that of 1950. However, Idaho still retained its position as the leading silver producer. Nearly 91 percent of this silver came from the mines in the Coeur d'Alene district. A decline in zinc output caused Idaho to drop to second place behind Montana. Recoverable zinc amounted to 79,783 tons in 1951, a decrease of nine percent over production from Idaho in 1950.

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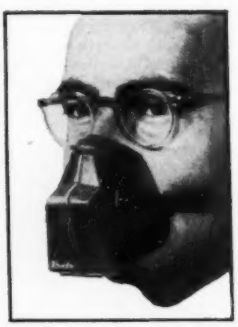

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Hunter Creek Mining Company has given stockholders preference on purchasing 400,000 shares of stock at 25 cents each to finance a proposed deep development program at its property in the Hunter district of the Coeur d'Alene, Idaho. Laurence Howe of Spokane, president, said the firm expects to conclude an agreement soon with the adjoining *Lucky Friday Silver Lead Mines Company* to explore Hunter Creek ground from the new 2,000-foot level of the Lucky Friday shaft.

Golconda Lead Mines of Wallace, Idaho, will unwater its shaft to the 1,800 level and undertake a thorough exploration program at depth, according to President A. H. Featherstone. A geological study made during 1951 indicated the program is warranted. Ore production currently is from the 1,150 winze level.

Signal Mining Company of Kellogg, Idaho, has reported cutting 4½ feet of zinc-lead ore in the old *Hilarity* mine in the Pine Creek district of the Coeur d'Alene mining region. Two crews are said to be stockpiling ore from the recently unwatered mine for future treatment at the Amy mill.

Hoodoo Mines, Custer county, Idaho, will be explored for zinc under a $14,000 DMEA exploration contract signed with Wylie M. Gardner of Wallace and L. R. Vance of Clayton, Idaho. The contract calls for diamond drilling primarily.

An automatic, alkalinity, mill circuit control is netting *Idaho Custer Mines, Inc.* from $3,000 to $5,000 monthly in added metal recoveries, according to Harry P. Pearson of Wallace, president. Additional mill and mine equipment costing $100,000 has been ordered for spring delivery at the mine near Mackay, Idaho. Recent purchases included a large bulldozer and a 15-ton truck. The milling rate is to be stepped up from its present 180 tons daily.

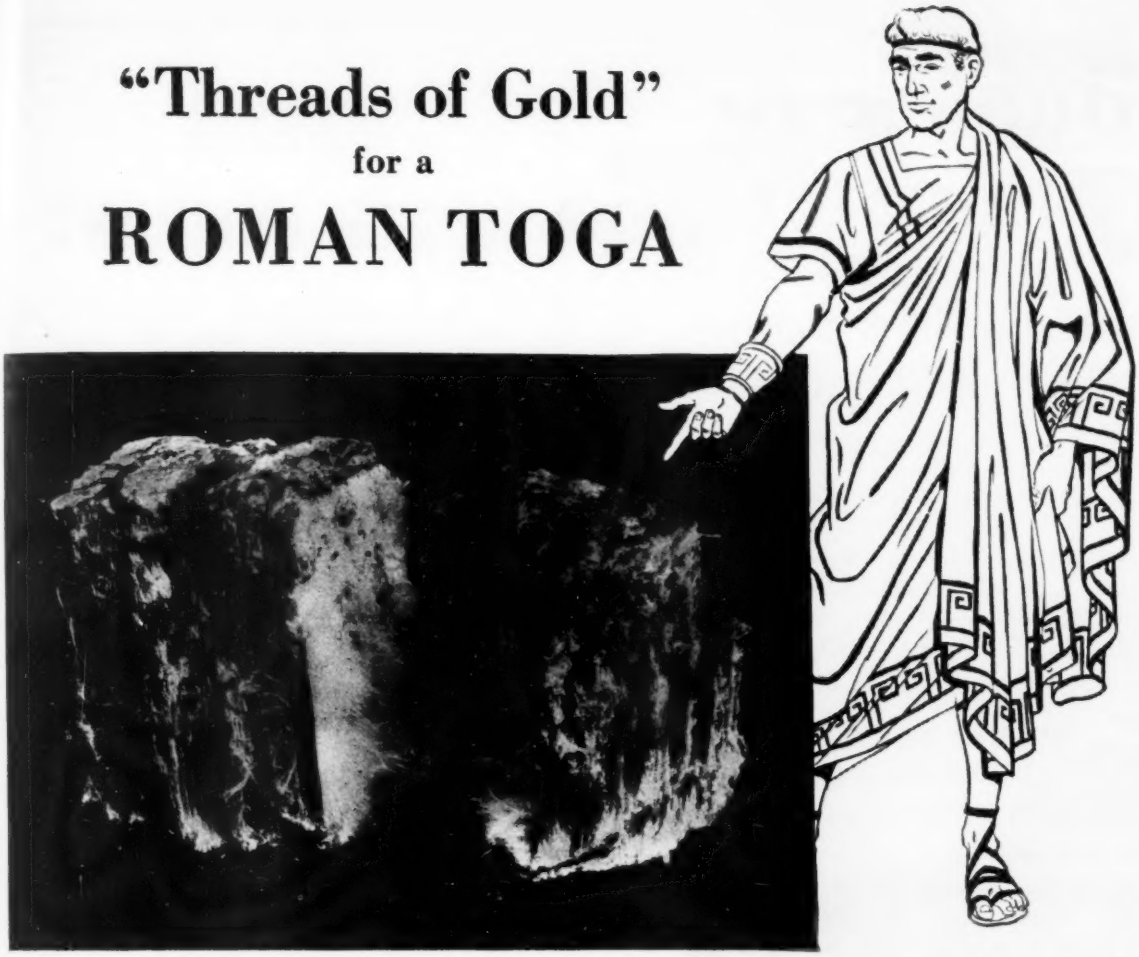
A new entrant in the race for monazite wealth in the Cascade area of Idaho is *Gem Monazite Mines* incorporated recently by a group of Boise residents. The company has leased about 1,000 acres along Clear Creek, eight miles south of Cascade, Idaho. The land is along both sides of the highway through the area and therefore has good transportation facilities for bringing in operating supplies and for taking out the recovered minerals when operations are under way.

Defense Metals, Inc., of Kellogg, Idaho has been capitalized for $500,000 at Boise by Lester S. Harrison, Wayne A. Brainard and P. J. Holtz, all of Kellogg.

Sullivan Mining Company, Burke, Idaho has put $100,000 in a college scholarship trust fund for children of employees working for Sullivan Mining Company, *Bunker Hill & Sullivan Mining and Concentrating Company*, *Hecla Mining Company*, and companies under the management of these three companies. Sullivan is jointly owned by Bunker Hill & Sullivan and Hecla. J. E. Buchanan, president of the University of Idaho, termed the fund "the most important grubstake of the mining industry in Idaho since the first prospector was staked to a burro load of flour and bacon."

Silver Lode, Inc., of Wallace, Idaho, has been incorporated to develop 10 mining claims adjacent to *Golconda Lead Mines* and *Hecla Mining Company's Rock Creek* property east of Wallace. Capitalization is $300,000. Incorporators are H. J. Rossi and Paul S.

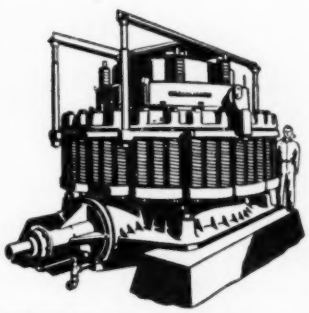
"Threads of Gold"
for a
ROMAN TOGA



The mineral *Chrysotile,* meaning golden fibers, or threads, supplies over 90% of the world's asbestos requirements. Called the "miracle mineral" by the ancients, the Roman naturalist Pliny (23—79 A.D.) refers to the use of such material as "a rare and costly cloth" used for the funeral garments of kings.

The secret of the great usefulness of asbestos lies in its unique combination of fibrous structure, fire and water resistance, flexibility and strength. Since the profitable recovery of asbestos fiber depends upon fine crushing without destroying fiber length, a crusher that will perform such functions economically, and will produce large quantities of finely crushed material, is essential.

Proof of the world-wide acceptance of *"SYMONS"* Cone Crushers in asbestos production is found in the field, where practically every major producer employs these high capacity, economical machines . . . *as in all of the great ore and industrial mineral operations the world over.*



"SYMONS" Cone Crushers . . . *the machines that revolutionized crushing practice* . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour. C252

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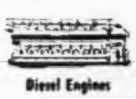
"SYMONS" Primary Crushers

Grinding Mills

Mine Hoists

"SYMONS" Vibrating Bar Grizzlies and Screens



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(R. R. Station: Bradley, Idaho)

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Lead and Lead-Zinc Smelter
Lead-Zinc Concentrator
} Tooele, Utah

Address: Ore Purchasing Department

International Smelting and Refining Co.

818 Kearns Building
Salt Lake City, Utah

Please establish contact prior to shipment.

Boyd, assistant United States district attorneys at Boise; H. S. Anderson, Coeur d'Alene attorney; and R. J. Fanning, Wallace attorney.

Eastern Lead Corporation stockholders have elected Joseph V. Grismer, pioneer Wallace mining man, president to succeed the late Donald A. Callahan. The firm is negotiating with large operators for development of its eight-claim property east of Mullan, Idaho.

MONTANA

The *Mineral King Mining Company* is reported to be considering proposals from two major mining companies for development of its 33 claims about four miles north of Saltese, Montana.

Mitchell Mining Company, Butte, Montana, is now sinking a winze at its *Mitchell* mine from the 300- to the 500-foot level on the south vein in ore carrying about 1/3 ounce of gold, 35 ounces of silver, and 3 percent zinc. The vein is four feet wide. Stoping is progressing to the surface. A crosscut is being driven from the south vein to the north vein which is four feet wide, carrying about 1/3 ounce of gold, 40 ounces of silver, and over 15 percent manganese. Because of the low government price for manganese, Mitchell is shipping this ore to an East Helena smelter as a gold-silver ore. The property is about 1,500 feet north of the famous Rainbow vein system. More than 40 railroad cars (55 tons each) have been shipped since November 1951. The company has options on 12 more claims in the same area owned by Frank Benich.

American Alloy Metals Company has entered into a $56,584 contract with the Defense Minerals Exploration Administration for underground development at its *Browns Lake* tungsten project south of Butte, Montana. Plans call for extending an old 90-foot adit 160 feet to cut a tungsten-bearing ore body indicated by diamond drilling under a $33,290 DMEA contract signed last August. The ore body would be opened by laterals off a 100-foot raise. E. A. Julian, of San Francisco, is company president, and Frank Eichelberger, Spokane mining engineer, is vice president.

Sylvan Gold Mines, Inc., and D. A. McNab of Basin, Montana, have been granted a $20,616 DMEA loan for uranium exploration at the Sylvan property in Jefferson county, Montana. McNab is developing the former gold-silver-copper-lead producer under lease. Total cost of the exploration will be $22,907. Otto A. Bittrick of Seattle and Harve H. Phipps of Spokane head the company.

Castle Lead and Zinc Company will explore its Meagher county, Montana, property for lead and zinc under a $99,850 DMEA contract. The government will provide $49,925 of the cost.

Linton Mines, Missoula county, Montana, will receive $26,270 in federal aid under a $52,540 DMEA lead exploration contract.

Sunlight Mining Company has contracted to sell 10,000 tons of phosphate rock to *Consolidated Mining and Smelting Company of Canada*, according to Wellman A. Clark of Spokane, secretary. The phosphate will be mined from the company's *Moonlight* property near Maxville, Montana.

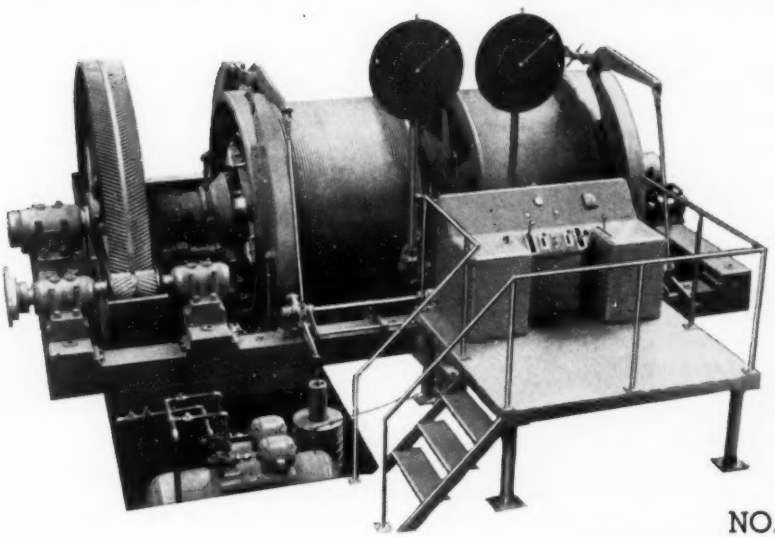
Recent tungsten strikes have been made in the Troy and Libby mining districts of Lincoln county, Montana. The scheelite-bearing vein on Miller Creek near Libby was discovered by Danny Waylett. It is said to vary from 6 to 12 feet in thickness with mineral-lamp-indications of disseminated scheelite throughout the width of outcrop.

OREGON

A $200,000 chrome concentrator plant of 400 tons daily capacity is now in operation on the leased property of *Chrome Milling Company* near Grants Pass, Oregon. Jesse L. Rice is president of the newly organized company; Louie J. Rice is secretary and general manager; Louis F. Rice is vice president and treasurer; and E. R. Waite is director. The Rice brothers are construction contractors of Marysville, California, while Waite is a Grants Pass mine owner. The ball mill from the old *Benton* mine was purchased and installed at the new plant.

Vanadium may be economically recovered from western phosphate rock by a combination of beneficiating, smelting, and roast leach processes, according to a report prepared by the United States Bureau of Mines at its northwest regional

VULCAN-DENVER



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Rope Pull 26,000/15,000 Lbs.
Drums: 96" diameter x 60" face. One 600 H.P. Motor.

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VULCAN - DENVER HOISTS
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headquarters in Albany, Oregon. Results of extensive tests in Oregon and Idaho to extract the scarce metal are given in the report written by Lloyd H. Banning, metallurgist, and R. T. C. Rasmussen, chief of the ferrous metals branch.

The *Platner* mine, Crook county, Oregon, will be explored for mercury under a $20,460 DMEA contract with Owen Pigmon. The government's share will be $15,345.

The *Bonanza* quicksilver mine at Sutherlin, Douglas county, Oregon, is producing about six flasks a day from its Gould furnace. Exploration in new ground south from the old workings is said to have developed ore bodies on the 500 and 600 levels. A new block of ore has been developed from the 500 up to the 300. The drift on the 600 was reported to be barren but a raise is supposed to have run into an ore shoot above this level.

The *Ashland Mining Company's* mill, about one mile west of Ashland, Oregon, is being readied for use in concentrating both tungsten and chromite ores. The mill was used for principally for gold ore in the past. Equipment includes a jaw crusher, Hardinge ball mill rated at about 50 tons per day, and two concentrating tables. A jig and two additional concentrating tables will be installed to handle the chromite ore. Scheelite will come from the Mattern deposit on the Southern Pacific Railroad right-of-way one mile northwest of Ashland. Concentrating grade chromite ore will come from three claims recently leased by the company from H. Z. Bielenberg of Galice, Oregon. The properties are the *Shady Cove*, *Chrome Monument*, and *Rocky Point*.

A small crusher, an ore roller, a vibrating screening machine, and an electric drying oven have been installed recently at the Grants Pass chrome depot in Oregon. A large crushing machine has been in use for some time. The depot has been in operation since August of last year. The majority of chrome mines were closed during the winter because of snow but shipments are being resumed again.

WASHINGTON

Beryl ore shipments are scheduled to start about April 15 from a deposit 10 miles north of Chewelah, Stevens county, Washington, according to Earl Cannon and his son, Perry, who control the property. F. G. and F. B. Cannon of Compton, California, brothers of Earl, have become associated in the enterprise. They are in the mining equipment and diamond drilling business. The Cannons have leased some adjacent ground from the Northern Pacific Railway. They expect their ore to run 8 to 14 percent beryllium.

Pioneer Mining Company has installed more than $12,000 worth of additional mining machinery at its *Longshot* mine in the Old Dominion district of Stevens county, Washington, Darrel A. Newland of Colville reports. A mucking machine, "cherry picker," and stationary air compressor are included. At 135 feet below the surface, an additional 300 feet of tunneling is exepcted to reach a silver-lead-zinc ore body opened by open-pit mining last summer. The adit was started wh road conditions halted trucking of ore la fall. Snow halted work at the 118-fo point.

At a cost of $3,319,248, *The Carboru dum Company* plans to double the c pacity of its plant at Vancouver, Washin ton, where it produces silicon carbide f the national defense effort. The gover ment has authorized the company to d preciate 65 percent of this amount over five-year period, instead of 25 years, fo tax purposes.

New Jersey Zinc Exploration Company a subsidiary of *New Jersey Zinc Compan* of New York, has opened an office i Spokane, Washington, in connection wit the firm's search for lead, zinc, and cop per mines. The firm has an interest in th $1,000,000 deep development project now under way at the *Atlas* property near Mullan, Idaho. A *Kennecott Copper Corporation* subsidiary recently opened a Spokane office also.

The old *Lucille* mine, two miles northeast of Leadpoint, Stevens county, Washington, will be explored for lead-zinc under a $37,284 DMEA contract signed with Stephen W. Zoldok, Spokane mining engineer. Work will consist of surface bulldozing, diamond drilling, and boring of a lower tunnel to get depth on two oreshoots disclosed in upper workings.

American Smelting and Refining Company has started to install mill machinery at its 1,000-ton zinc-lead concentrator at the *Van Stone* property in Stevens county, Washington. More than 100 men have been working all winter on the mill building and stripping of overburden from the ore zone which will be mined by open-pit methods.

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Above photograph shows a new manganese crushing roll 22" by 40", that has been properly coated with RESISTO-LOY for a special job of crushing extremely hard, river-bottom gravel to ⅝" minus. Note the reversing diagonal beads of RESISTO-LOY to assist the even distribution of the round rock coming into the rolls.

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Huge Taconite Plant Proposed for Minnesota

A $300,000,000 project to produce up to 10,500,000 tons annually of iron ore pellets from taconite is under consideration by the Erie Mining Company. An application for a certificate of necessity covering the entire project has been filed with the Defense Production Administration.

The program calls for construction of a plant on the Mesabi Range northeast of Aurora, Minnesota where the company has been operating a preliminary experimental taconite plant for several years. This is the only plant in existence which has produced pellets in large quantities from Lake Superior taconite.

A new community would also be built east of Aurora for plant employees and their families. A large power plant and a railroad would be erected to carry the pellets from the plant to docks and loading facilities at Two Islands, Minnesota. The proposed initial unit would have an annual capacity of at least 5,000,000 tons, which would probably take four or five years to attain. Construction of additional units would continue until production had reached 10,500,000 tons per year.

Erie is owned by Bethlehem Steel Corporation, The Youngstown Sheet and Tube Company, Interlake Iron Corporation, and Pickands Mather & Company.

To Expand Production Of Reserve Mining

Reserve Mining Company will expand its taconite program by 50 percent. The original plan was to construct facilities to produce 2,500,000 tons of the concentrated ore. With the expansion, production of 3,750,000 tons will be possible.

Completion of the initial program was expected by 1955. The expansion will probably be finished about two years after that. The entire project is expected to cost more than $160,000,000.

Armco Steel Corporation and Republic Steel Corporation, partners in Reserve Mining, both need additional ore for their new blast furnaces. Rather than tap other mining sources, they prefer to expand Reserve's capacity.

Reserve recently started construction of the 2,500,000-ton Lakeside project near Beaver Bay, Minnesota. A smaller production plant of 300,000-ton capacity at Babbitt, Minnesota is expected to be completed shortly. The taconite is to be blasted out of the company's pits at Babbitt, at the extreme eastern end of the Mesabi Range.

Ford and Cleveland-Cliffs Form Humboldt Mining

The company jointly formed by Ford Motor Company and the Cleveland-Cliffs Iron Company to develop jaspar in Michigan has been named Humboldt Mining Company.

Between $10,000,000 and $15,000,000 will be spent on the development of the Humboldt mine in Michigan's Marquette Range. Two 200,000-ton concentrating units will be erected, the first scheduled to go into production by late 1953.

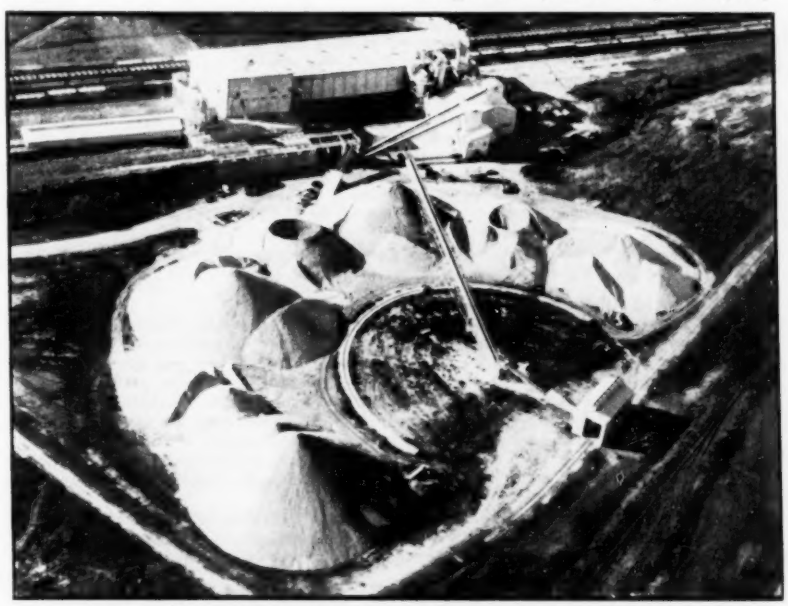
Jaspar is a low-grade, iron-bearing rock, in many ways similar to taconite. The entire production is expected to go to Ford to make iron and steel.

A zinc-lead strike has reportedly been made in the old Sunnyside district south of Baxter, Oklahoma, by Hise Green of Joplin, Missouri, and F. T. Ammann of St. Louis. The men are said to have struck a mineral cave at the 62-foot level while drilling in virgin ground on the *Blackhawk* lease. A concentrating plant has been erected at the site. The 200-acre property lies in the center of an area formerly surrounded by the old *Blacksnake*, *Lead Boy*, *Lancaster*, and *Omaha* mills.

Freeport Sulphur Company has developed a new process which will enable it to use sea water in mining its newly discovered sulphur deposit at Bay Ste. Elaine in the Louisiana marshes. Sulphur mining by the Frasch process requires large amounts of fresh water. With no fresh water available near Freeport's new property, engineers devised a way of passing the sea water through packing and treating it with flue gases from the steam boilers to remove most of the oxygen present in the water. This is expected to reduce the corrosion usually caused by salt water so that the deposit can now be mined.

The *Mining & Smelting Division* of the *Eagle-Picher Company* is developing a new zinc-lead mine near Hazel Green, Wisconsin. An incline with a 10-percent grade is being sunk from the surface to the ore body. After the mine has been developed, the ore will be trucked to Eagle-Picher's mill north of Galena, Illinois for treatment.

Since *Quincy Mining Company* started its reclamation plant at Torch Lake, Michigan in November 1943, it has recovered over 20,000 tons of copper from the old lake bed tailings, resulting from many years of former mine operation. In 1951, out of a total of 1,006,355 tons of tailings treated, the recovery was 5,946,-



NEW PHOSPHATE STORAGE FACILITIES

The first storage system of its kind in the phosphate industry is installed at American Cyanamid Company's plant in Brewster, Florida. Rock from Cyanamid's two nearby phosphate mines arrives at the Brewster "dry" plant in hopper-bottom cars which dump directly into a track hopper. The rock is then fed onto a 36-inch-wide conveyor belt running up an 80-foot-high stacker which pivots over a wide semi-circle. This rotation is controlled from the track hopper building. Under the stacker is a semi-circular storage pile consisting of various grades of rock at different points. The rock is dropped from the top of the stacker onto the appropriate part of the pile below. Directly under the different grades of rock in the storage pile are evenly spaced openings into a continuous underground tunnel of reinforced concrete. Gates at the top of the tunnel control the flow of rock to conveyor belts which eventually deliver the rock to the "dry" plant.

U.S. METAL & MINERAL MARKETS

METALS

March, 20, 1952

COPPER:	Electrolytic. Delivered F.o.b. cars, destination U.S.A.	24.50¢
	Lake. Delivered, destinations U.S.A.	24.625¢
	Foreign Copper. New York	27.50¢
LEAD:	Common Grade. New York	19.00¢
ZINC:	Prime Western. East St. Louis	19.50¢
ALUMINUM:	Primary 30 pound Ingots (99% plus). F.o.b. shipping points	19.00¢
ANTIMONY:	Bradley Mining Co.'s Elk Brand 99.5%. F.o.b. Cascade, Idaho	50.00¢
	Lone Star Brand. F.o.b. Laredo, in bulk	50.50¢
BISMUTH:	(In ton lots) price per pound	$2.25
CADMIUM:	Sticks and bars. 1 to 5 ton lots (Price per pound)	$2.55
COBALT:	97-99%, keg of 550 pounds (Price per pound)	$2.40
MAGNESIUM:	Ingots (99.8%). F.o.b. Freeport, Texas	24.50¢
MERCURY:	Flasks. Large lots, New York	$203.00-$207.00
NICKEL:	"F" Ingots (5 pounds). F.o.b. refinery, Port Colburne, Ontario	56.50¢
TIN:	Grade A Brands. New York (Price per pound)	121.50¢
TITANIUM:	(98.5%). F.o.b. Beverly, Massachusetts	$7.00
GOLD:	United States Treasury price	$35.00 per ounce
SILVER:	Newly mined domestic. United States Treasury price	90½¢ per ounce
	Foreign. Handy & Harman	88.00¢ per ounce
PLATINUM:		$90.00-$93.00 per ounce

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO. F.o.b. mine, Colorado	$35.00 per unit
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr_2O_3.	$43.00-$44.00
	African (Transvaal). 48% Cr_2O_3.	$34.00-$35.00
	Turkish. 48% Cr_2O_3. 3 to 1 chrome-iron ratio	$52.00-$53.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Ports.	
	Mesabi, Non Bessemer, 51.5% Fe	$ 8.30
	Mesabi, Bessemer, 51.5% Fe	$ 8.45
	Old Range, Non Bessemer	$ 8.55
	Old Range, Bessemer	$ 8.70
MANGANESE ORE:	Metallurgical grade. 46 to 48% Mn. Long ton unit	$1.10 to $1.18
	Chemical grade. 80% MnO_2. Per ton	$60.00
	Chemical grade, domestic, 70% MnO_2, F.o.b. mines	$45.00
	U. S. Government ore purchase depot Deming, New Mexico. Base price, $6.10 per long dry ton for 15% ore. Price increasing to $76.00 for 40% ore. Less $12.00 per long dry ton for milling. U. S. Government purchase depot Butte, Montana. Base price, $6.05 per long dry ton for 12% ore. Increasing to $40.42 for 30% ore. U. S. Government purchase depot Phillipsburg, Montana. Base price, $6.43 per long dry ton for 15% ore. Increasing to $34.81 for 30% ore. (Montana ore must contain not less than 90% as carbonate).	
MOLYBDENUM CONCENTRATE:	90% MoS_2. F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	$1.00
TUNGSTEN CONCENTRATE:	60% WO_3. Per short ton unit	$65.00
URANIUM ORE:	Carnotite-Roscoelite. F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita, and Uravan, Colorado. Salt Lake City, Marysvale, Thompsons, and Monticello, Utah. Shiprock, New Mexico. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime content.	
VANADIUM ORE:	Carnotite-Roscoelite. V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello and Shiprock.	

NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	Metallurgical grade. 70% effective CaF_2 content per short ton F.o.b. Illinois-Kentucky mines	$43.00
	Acid grade. 97% CaF_2	$60.00
PERLITE:	Crude: F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants per short ton	$7.00 to $9.00
	Concrete grades. Crushed and sized	$6.00 to $8.00
SULPHUR:	Long ton, F.o.b. Gulf Coast mines	$22.00

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N.Y.

545 pounds of refined copper, or 5.9 pounds of copper per ton of sands handled.

The *American Zinc, Lead & Smelting Company* has completed a new research laboratory at Kirkwood, Missouri. The new laboratory will be devoted exclusively to new products development and will supplement the company's present research program. Dr. H. A. Depew, who has been connected with American Zinc since 1931, will direct the new project as director of the St. Louis Research Division.

A new process for beneficiating Arkansas bauxite ores that have a high iron content and which have not until now been utilized for commercial production of abrasives and alumina is described in a U. S. Bureau of Mines report recently released. Tests employing the new process have shown an over-all recovery of about 98 percent of the alumina in the Arkansas bauxite. A free copy of Report of Investigations 4841, "Beneficiation of High-Iron Arkansas Bauxite Ore," may be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pennsylvania.

For the first time since *Jones & Laughlin Steel Corporation* reactivated the *Benson* mines at Star Lake, New York, the year's shipping total went over the 1,000,000-ton mark. In 1951, a total of 1,037,703 gross tons of sinter and concentrate were shipped from the Benson plant to J&L steel mills in the Pittsburgh, Pennsylvania area.

A production goal of 1,320,000 short tons of zinc in the form of metal and zinc in salts and pigments has been set for zinc producers in the United States by 1955. The expansion will increase the annual supply by about 230,000 short tons over the 1950 supply of 1,093,000 tons. Of the additional supply, 190,000 tons annual production will be provided by new facilities, and the remaining 40,000 tons by anticipated changes in production from existing sources. Already certified by DPA for government assistance in the form of rapid tax amortization, working capital loans, or floor price purchase contracts are 178,000 tons; applications for government assistance for the balance of 12,000 tons of annual production are being reviewed.

The *Pennsylvania Railroad Company* will have two ore unloading towers at its new pier, being built at South Philadelphia, Pennsylvania. The towers will be used to unload imported ore for transshipment by rail. Each will be capable of handling 1,200-long tons per hour of 150-pound-per-cubic-foot ore on a 45- to 50-second cycle. Two aprons will permit unloading from either side of the pier.

The *Shook & Fletcher Supply Company* is making plant additions to its Warner iron ore washing plant near Russellville, Alabama. The new Wemco classifier unit will treat 35 tons per hour of minus 20-mesh log washer overflow, and recover appreciable amounts of fine iron minerals.

PROFESSIONAL DIRECTORY

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The *E. W. Coons Company*, one of the active smaller companies in Michigan, shipped 413,200 tons in 1951. Among the smaller companies in Minnesota, the *Jessie H. Mining Company* shipped 149,335 tons from the *Jessie* mine near Grand Rapids; the *Charleson Iron Mining Company*, 239,578 tons; *Zontelli Brothers, Inc.*, 380,315 tons; *Rhude & Fryberger*, 331,039 tons; the *Haley-Young Mining Company* and *E. A. Young, Inc.*, a combined total of 221,643 tons; the *Stanley Mining Company*, 464,820 tons (all concentrates); *W. S. Moore & Company*, 708,309 tons exclusive of 251,462 tons loaded at the Knox extension under contract for the *Oliver Iron Mining Division*.

The *E. J. Longyear Company* has been drilling for some time in the Fortune Lake area near Crystal Falls, Michigan for *Pickands Mather & Company*. More than 15 holes have been put down in the area where the overburden runs about 90 feet deep. If the quantity and quality of the ore found justify the cost, this may be an open-pit operation.

A group of Minnesota men, including E. W. and J. F. Hallett of Crosby, Minnesota, J. F. Lorge of St. Peter, and R. N. McGiffert of Duluth, have organized the *Brunswick Silica Company*. The company will operate on open-pit mine and will build a plant at Brunswick, Ohio, to produce a metallurgical gravel for steel plants and sand for glass manufacturer.

Pacific Isle Mining Company, Hibbing, Minnesota, shipped 372,929 tons of iron ore in 1951 from 18 leases, most of which had been "exhausted" by former operators. Improvements in beneficiation processes during the last few years have brought once sub-marginal ores that had been left behind by other operators, into the commercial ore class.

Pickands Mather & Company is stripping its new *West Hill* mine on the western Mesabi between Coleraine and Grand Rapids, Minnesota.

The *Minnesota Ore Division* of *Jones & Laughlin Steel Corporation* is preparing to begin stripping operations at the *Lind-Greenway* property (about five miles east of Grand Rapids). The two mines will form a single operation with a total estimated tonnage of about 5,500,000 tons. The Greenway was opened up in 1940 and has shipped 868,449 tons, while the Lind is a new operation. A bridge will be built across the Prairie River; mine buildings will be located on the Greenway property with ore from the Lind trucked over to the bridge to the plant. Ore shipments are scheduled for 1954.

The *Great Northern Railroad* has 700 ore cars on order for the 1952 shipping season, along with 25 Diesel electric locomotives, box cars, gondolas, and other equipment totaling $27,000,000.

The *Oliver Iron Mining Division's* program for stripping 50,000,000 cubic yards of rock from its Mesabi Range properties in Minnesota is well advanced. It was estimated that about three-fifths of the work could be done during the winter months, thus keeping Oliver's labor force fully employed in the winter as well as in the summer. The division plans to uncover from 45,000,000 to 50,000,000 tons of ore, needed this year for Oliver's shipments.

With so many companies planning mining and concentrating of taconite on a commercial scale, predictions are being made that, by 1960, 20,000,000 tons of taconite concentrates per year will be produced, with 40,000,000 tons by 1970. There are also rumors that a new harbor will be built on Lake Superior, northeast of Two Harbors, Minnesota.

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Tungsten

Continued from page 37

ministration of such a Government approved refinery will be designed to assist the western mines, establishing a fully integrated industry preferably operated by western mine interests and not eastern consuming industry.

The emerging tungsten industry is in an extremely vulnerable position at this time to the policy and pricing of the refining step. The small miner particularly is dependent upon auxiliary refining facilities operated at a minimum profit basis to place his operations on a sound basis. Eventually the tungsten miner will probably provide his own salvation by providing his own refining facilities.

Importance of Specifications

Specifications on tungsten concentrates vary, depending on the use intended for the concentrates. The ferrous industry supplying tungsten in the molybdenum type of tool steel can relax its molybdenum limits (as is now currently the case) because of the molybdenum in the product. Usually tool steel melts are made up of scrap, scale and other materials of variable molybdenum content and it is often desired to control the tungsten and molybdenum content in the product by, low molybdenum, ferro tungsten. Therefore, there is always consumer resistance to high molybdenum bearing tungsten concentrates, especially in times of plentiful supply.

The use of tungsten in tungsten carbide and metal powder has grown from five percent of consumption in 1943 to over 50 percent, and the trend appears to indicate that eventually the largest part of tungsten production will be used in this market. For this use molybdenum over 0.10 percent is definitely objectionable.

The miner often considers tungsten specifications as arbitrary, but fails to understand that this is necessary because the producer of tungsten alloys is meeting ever increasing demands for higher purity in his tungsten products.

If the consumer cannot purchase suitable concentrates from the tungsten producer he will eventually be forced to set up his own supply, and the tungsten miner who cannot meet the specifications of industry must continue to operate on an unstable basis, selling his product only when demand exceeds the supply available from other sources.

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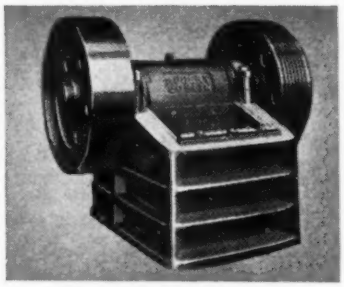

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NO MORE INQUIRIES PLEASE!

The New Mexico beryl deposits advertised for sale in the February issue are no longer being offered and the advertiser has disassociated himself from any interest in same. F. A. Bunch, Las Cruces, N. M.

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FOR SALE: Mill of 50-ton capacity located 8 miles north of Baker, Calif. on highway 127. Practically new equipment, new buildings, and well with unlimited water at 65 feet below surface. Excellent location for private or custom mill. For further details write J. Bryant Kasey, Box 968, Bakersfield, Calif.

FOR SALE OR LEASE: Two lead-zinc mining claims in Walker District, near Prescott, Arizona. Reply Box D-4, MINING WORLD, 121 Second St., San Francisco 5, Calif.

WANTED TO BUY: Working interest in an Assaying-Engineering Laboratory by graduate engineer with years of successful experience in wet and fire assaying. Registered Professional Metallurgical Engineer. Reply Box No. C-1, MINING WORLD, 121 Second St., San Francisco 5, Calif.

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152 acres in proven mining district. Borders 1,200 ft. on east line of new open pit project. Will lease on percentage. For information contact Mr. Remi La Londe, 2066 Nord St., Compton, Calif.

FOR SALE: Owner wishes to sell unencumbered patented placer gold property in Alaska. Engineer's report, based on drilling, shows large value. Will sell for small fraction of potential worth. Investigation invited. Reply Box D-5, MINING WORLD, 121 Second St., San Francisco 5, Calif.

FOR SALE: 16 Uranium mining claims which are located in the now producing uranium Gateway district in southwestern Colorado. $32,000.00 or $2,500.00 cash per uranium claim. Reply Box D-3, MINING WORLD, 121 Second St., San Francisco 5, Calif.

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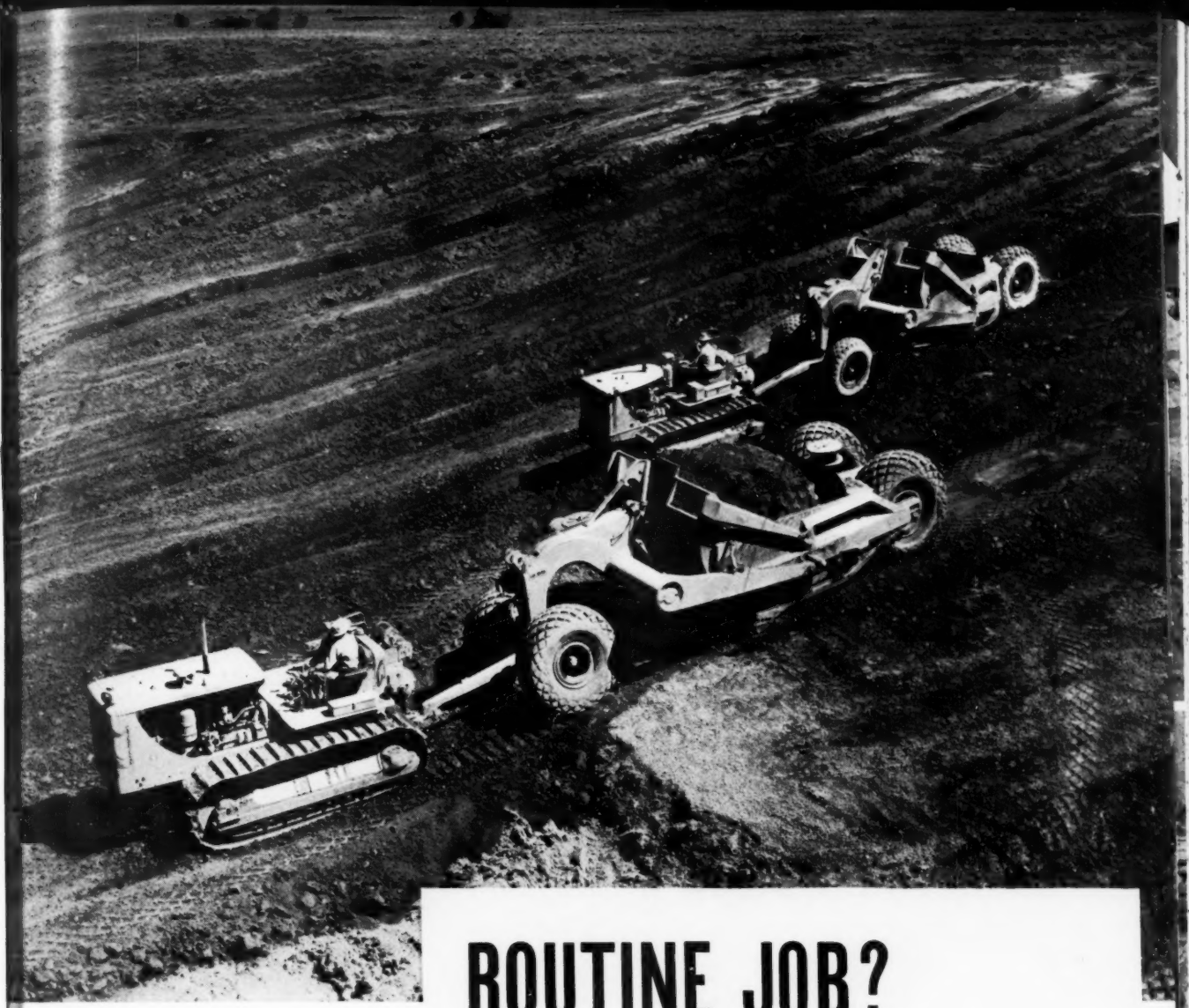
EXPERIENCED Hard Rock Supervisor would like position as foreman or shift boss in a Gold, Silver, Copper, Lead, Zinc, or Tungsten operation anyplace in the Northwest Quarter of the United States, can furnish reliable references. Reply Box D-1, MINING WORLD, 121 Second St., San Francisco 5, Calif.

Equipment for Sale

FOR SALE: ING-RAND COMPRESSOR. Imperial type 10, 9"x15"x12", 550 cfm. with endless leather belt. Excellent condition. 100 HP, GE Electric motor, 3 ph. 440 volt, with switches. Box 173, Oracle, Arizona.

FOR SALE: HOIST. 50-HP Hendrie & Bolthoff Mine Hoist, Post Brakes, depth indicator, FLOTATION DENVER 18-in. special, six cells, three 7½ HP motors, starting switches. Run less than 1000 tons. Vernon Engineering Co., 2415 East 56th St., Los Angeles 58, Calif. KImball 3164.



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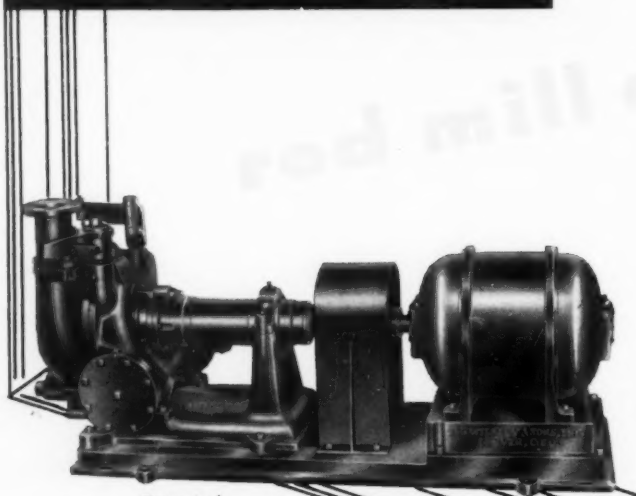

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